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### TRACK SUPERSTRUCTURE IN TUNNELS.

The Pennsylvania is considering, and the Lackawanna has adopted, designs of tunnel tracks in which no ballast is used, the rail resting on wooden blocks embedded in concrete. This idea is novel for use under heavy traffic. Much the same system is used, under light traffic, in the Philadelphia Rapid Transit subway and in the Hudson tunnels between New York and Hoboken. The Philadelphia subway was described in the *Railroad Age Gazette*, August 14. In this case 90-lb. rails are fastened with clips, without tie plates, to wooden blocks 6 in. thick, resting on the upper flanges of a pair of longitudinal channels embedded in the concrete. In the Hudson tunnels, complete standard ties are used, but they have the effect of wooden blocks, as for two or three feet at each end they are embedded in concrete. The load on the rail is thus transmitted directly to the concrete without any tendency to bend the tie, so that the part of the tie in the center of the track does no work. In the center of the track is a gutter for drainage. This design is standard through most of the Hudson

tunnels, though in some cases the track is ballasted in the usual way.

In these two subways, however, the track is called on to carry axle loads much lighter than those which the Pennsylvania and the Lackawanna use. The new designs are a comparatively rigid form of track construction. The Lackawanna calculates that under a 60,000 lb. axle load (the highest the road now uses is about 53,000 lbs.), with 30 per cent. added for impact, the greatest deflection of rail will be one sixty-fourth of an inch. In track where the tie acts as a resilient girder resting on ballast in which there is also some give, the deflection is one-eighth to one-quarter of an inch. It is granted that an absolutely rigid superstructure would be ideal if the rail surfaces were absolutely true. But it is impossible to maintain such conditions, and a slight inequality, such as the gap at the rail joint, causes such shocks that rigid superstructures heretofore tested have not been successful. The present standard resilient track construction, therefore, has been necessary, though it is admitted that it is not ideal. The proposed designs are not absolutely rigid, but the cushioning effect of red oak or yellow pine blocks is not comparable with the give in a cross tie resting on ballast. The structure in itself is presumably strong enough to withstand the shocks referred to above, as high grade concrete can be made to withstand the crushing effect, but the result on rolling stock, and, in the case of the Pennsylvania, on the whole tube construction, can only be determined by experience.

In considering the effect of vibration in tubes, it is worth while to point out two types of construction particularly designed to prevent this. The Baker Street & Waterloo (London) permanent way construction was illustrated and described in the *Railroad Gazette*, April 20, 1906, p. 118, and May 29, 1908. In the Central London, "Tuppenny Tube," the track was carried on timber laid across the tube. There were damages costs due to the vibrations from this track. In the Baker Street & Waterloo, the center of the cross tie, for a distance of 3 ft. 10 in., is rigidly supported by concrete in which it is embedded. Under the ends of the ties, beneath the rail, is ballast consisting of washed granite cubes crushed to pass through a one-quarter inch ring. This design violated one of the usually accepted principles of track construction, being an absolutely center bound track. Ordinary wood would not stand the strain and Australian jarrah wood was used. This is so strong and elastic that although the fulcrum about which the end of the tie bends is only a few inches from the point where the load is applied, that is, the point under the center of the rail, the tie bends enough to give a vertical movement of about one-eighth of an inch directly under the rail; the tie is free to lift somewhat in the center. The ties have stood up under this treatment and the results in reducing the wheel-on-rail noise and in deadening vibration seem to be ideal. The latter has been proved by tests with seismography instruments.

In the Interborough Rapid Transit subway, the ends of the ties rest on concrete, each end having a bearing of 9 in. on it, beginning 9 in. outside of the center of the rail. The middle of the tie is entirely unsupported, the space beneath and between the ties being filled with coarse ballast untamped, the ballast only serving to fill up the space to the top of the tie, as otherwise refuse would accumulate in the center of the track. In this way, advantage is taken of all the resiliency which the tie can give.

There is no doubt but that it would be much simpler to renew the tie blocks than to renew ties in ballast, particularly in tunnels where space in which trackmen can work is limited and where traffic is so heavy that it is difficult to put a track out of commission except for very short periods. However, it must be considered that tie or tie block renewals should be much fewer in these two tunnels than in exposed track. The timber to be used is to be creosoted or otherwise treated. Still more important is the fact that both tunnels will be

dry, both being lined with concrete. The effect on the life of ties of protection from rain and dampness is indicated by the experience in the Interborough Rapid Transit subway. Here untreated yellow-pine ties are used and it is believed that they will last twice as long as they would in the open. This subway has been in service for only four years, it is true, but so far the only tie renewals have been of those which have been spike killed in renewing rails. On the sharper curves, the average life of rails is about one year. Because of the Pennsylvania and Lackawanna designs of rail fastening, and the fact that the blocks are held solidly in place by concrete, it is plain that re-spikeing in maintaining alinement will also be to a great extent eliminated.

#### PERMANENT USES OF THE RAILWAY BUSINESS ASSOCIATION.

In the issue of October 16, page 1132, we discussed the formation of the Railway Business Association by an extremely large and strong group of manufacturers of railroad supplies. We have also reported fully the work which the association has been doing, and doing very earnestly and efficiently, in its efforts to organize the friends of the railroads somewhere nearly as effectually as their enemies are organized.

The association has shown at the very outset the wisdom that makes for permanence, in its unalterable decision to keep out of politics. It does not exist for the purpose of buying votes, or of electing Congressmen, or attempting to coerce employees. And yet there is a perfectly legitimate political function which the association could well perform, and which it is very much to be hoped that it will perform; the function of watching pending legislation, regardless of party lines, with the sole purpose of dragging out into the open air the kind of "strike" bills which usually flourish in the dark. In this non-partisan way, the City Club in New York now keeps watch of legislation at Albany, and prepares a directory of assemblymen and state senators at the time of each election, with detailed reasons why they are useful, harmful or merely innocuous servants of the state. The Civil Service Reform Association keeps the same watch on civil service legislation, working always in the sunshine, and court-ing publicity rather than avoiding it. As things are now, bills of frankly outrageous character, aimed straight at the railroads, are apt to get very little discussion in legislative halls that is not wholly partisan, and there are few governors who have the courage to veto 2-cent fare bills, as Governor Hughes did, and express the desire that some information be obtained before the law is passed.

On one side has been the unscrupulous legislator without a grievance, working shoulder to shoulder with the honest but angry legislator who has one; on the other side has been the railroad attorney, able, but assumed to have a bias, and hence listened to by nobody. An association of manufacturers of railroad supplies also has an interest in railroad welfare, but there are no insuperable difficulties to an honest and purposeful watch on new legislation by such a body, whereas, the railroad counsel, from the nature of their employment, are all but useless in such an enterprise.

The Railway Business Association has taken another clear-sighted position in its recognition of the fact that the railroads themselves are to blame for a great deal of the trouble in which they now find themselves. Just how much they are to blame for, and how much is free gift, no man is wise enough to say. The question whether the railroad first corrupted the lobby or was first held up by it, is as difficult to determine as the respective seniority of the chicken and the egg. The Railway Business Association holds no brief in the case of Lobby vs. Highwayman; it wants to abolish both. Being a practical association, moreover, it realizes that manners are not as far behind morals as they are sometimes supposed to be, in their influence on contemporary history, and it sees with sorrow how many of the troubles of the rail-

roads have sprung out of plain, unmitigated bad manners, in dealings with passenger, shipper and manufacturer as well.

The strength and prestige of the association seems certain to grow with time, and it will be a helpful function and probably not an unattainable one, after this prestige has become very great, for the association to report just as frankly to the railroad company on cases of chronic, trouble-making bad manners, as it does to the intelligent voter on cases of flagrantly bad legislation. If it takes pains to be blind to the serious faults, not yet entirely eradicated, which have made unpopularity for the railroads, it can exert only a small influence with the sober-minded people in the community; but if it sees right and wrong clearly, and proclaims them freely, whether it finds them in the railroad office or in the legislative hall, it can have enormous possibilities of usefulness. The agitation of the past few years has accomplished one good piece of work in spoiling the job of the lobbyist, but this gentleman still survives, and it will not be long, in the ordinary course of events, before the old choice of wicked laws or a wicked lobby will again present itself. We do not know any better means of keeping the lobbyist permanently out of his job than the frank, helpful publicity of a great association, composed neither of railroads nor of legislators, but keenly interested in both.

#### A REVIVED COMPOUND.

The recent order of the Chicago, Milwaukee & St. Paul for 12 Atlantic type Vauclain compounds is a remarkable event in the history of locomotive practice in the United States. These engines have cylinders 15 and 25-in. x 28-in., driving wheels 85-in. and a boiler which provides 3,191 sq. ft. of heating surface. They are to be used on fast express trains weighing 600 tons on the line between Chicago and Milwaukee, and have been selected as the best type of locomotive for this service after experiments for years with a number of other types.

The Vauclain system of four-cylinder compound locomotives, with all cylinders outside, was patented in 1889, and up to 1904, 3,000 locomotives had been equipped with this form of compound cylinders. During the decade 1890 to 1900 they were used in large numbers by many of the trunk lines in the United States in both passenger and freight service. In 1896-98 the Baldwin works built 54 engines of this type for the Vladicaucase & South-Eastern Railroad of Russia; in 1898 20 engines of similar type for the Moscow-Windau Railroad of Russia. In 1898-99, 120 locomotives of the same type were built for the Chinese Eastern Railway; and in 1900 about 120 Vauclain compound consolidation engines were built for the Union Pacific. Since 1902 the orders for this type of compound locomotives have been rapidly growing less, and in more recent years the species has been generally thought to be almost extinct. The recent order from the St. Paul road is as much a surprise to the builders as to the railroad public.

On the Philadelphia & Reading the Vauclain compound was used on the Atlantic City branch and was noted for its successful service in maintaining the fastest schedules used in the United States with heavy trains of eight or ten cars. The piston valves, which are a distinct feature of this type of engine, were the first to be used on a large scale in this country. The large port area which they provided, together with the large cylinder volume in the four cylinders, enabled them to use a large volume of steam at high velocity, and this resulted in greater power than can be obtained from a simple engine of the same weight with the ordinary slide valve, which necessarily uses a short cut-off at high speed. The successful use of large piston valves in the Vauclain four-cylinder compound led to their general adoption for simple engines, and Mr. Vauclain should be given credit for his persistent effort in making the piston valve a success in



connection with his work on his first type of compound locomotive and for its successful use in simple engines. The capacity for obtaining high mean effective pressure and greater power in the cylinder at high speed is the reason why the four-cylinder compound was so successful in hauling passenger trains at unusually fast schedules. These engines do not show any economy in coal or water over the simple engine when worked at high speed, but the Vauclain compound freight engine, when properly maintained and operated on slow schedules, did show the economy which should ordinarily be expected from the use of compound cylinders.

In 1902 Mr. Vauclain designed the first four-cylinder balanced compound built by the Baldwin works, and for three or four years after that quite a number of this type were built by this company and the American Locomotive Company, which were used for express service on many of our principal railroads. The balanced compound was intended as a means of improving the counterbalancing, and it is a more highly developed machine, resulting in increased speed and hauling power and a decrease in the injury to the track, which is the principal objection to unbalanced engines running at high velocity.

The four-cylinder balanced compound does not show any important economy in coal or water at high speeds; the inside mechanism between the frames is not convenient for road or roundhouse repairs; the builders charged much higher prices for them than for equivalent simple engines; and the saving in damage to track has not been regarded as of sufficient importance to warrant the higher initial cost and additional trouble of maintenance.

The balanced compound, like its predecessor, has not continued in favor, and few if any of this type of locomotives are found among the new orders which are now coming in with increasing numbers. It is probable that the principal causes which have prevented the continued use of the compound locomotives in this country are to be found in the general conditions surrounding intensified transportation. The hurry in moving large volumes of traffic with limited facilities has led to careless work and lack of discipline. In such circumstances the simplest mechanism is preferred by the operators. To such causes must be attributed the failure of the railroads to introduce those refinements and more highly developed mechanisms in locomotives which good engineering has provided, and which under more favorable conditions would produce the best results. The compound engine, the superheater and the automatic stoker, as applied to the locomotive, are all examples of this failure of highly developed types of locomotives to persist in unfavorable surroundings.

In H. H. Vaughan's discussion of the report on superheating at the Master Mechanics' convention in 1907, he said:

"We have on the Canadian Pacific 375 large locomotives equipped with superheaters, while in the United States nothing has been done in this direction on any extended scale. The reason why the superheaters have not been more successful in the States is that they are not given proper attention, and if this is assured they can be operated without any more trouble than the ordinary locomotive. If we are to give up a device that will save from 10 to 20 per cent. in coal just because we cannot get roundhouse machinists and foremen to pay proper attention to their work we are on the wrong track. It is a question of attention with the superheater and not extra expense for maintenance."

This explanation of the slow growth of the superheater on locomotives in this country applies very well to the whole history of the rise and fall of the compound locomotive. The fact that the Vauclain compound has been used in large numbers on the St. Paul ever since it was introduced, and that new engines of this type have just been ordered, speaks well for the careful attention which the old engines have received from the men having to do with running repairs as well as from the engineers. This incident is most instructive and teaches that locomotive practice in the United States is governed more by the performance of the employees running the engines than by the influence of good engineering.

From an engineering standpoint the Vauclain compound freight locomotive is more consistent, as, if properly maintained, it would show some economy in fuel and slow speeds would make it less damaging to the track. In ordering passenger engines of this type the St. Paul has sought the advantage of greater power for handling heavy express trains than can be got from a simple engine of equal weight. The difference in fuel consumption will be but small and the damage to the track due to counterbalances for very heavy reciprocating parts is apparently not regarded as a sufficient objection.

#### THE UNIFORM BILL OF LADING.

The uniform bill of lading recommended by the Interstate Commerce Commission has been adopted by the Official Classification and the Western Classification roads. The classifications in both territories soon will provide that any shipper who does not ship subject to the conditions of the new bill will be charged a rate 10 per cent. higher than the published tariff. The southern lines would all give it their endorsement if they did not think that it does not make entirely satisfactory provision for the handling of cotton. Being a compromise measure it naturally does not in every way suit anybody. But on the whole it is the best and fairest bill of lading ever drawn up in this country.

Unfortunately, as the Interstate Commerce act reads now, the new bill of lading has little legal standing. The Hepburn act amended the law so as to provide that the initial carrier shall be liable for "any loss, damage or injury" to shipments by any carrier over whose lines the goods pass, and that "no contract, receipt, rule or regulation shall exempt" from such liability. If that provision is constitutional any shipper may at any time refuse to sign the uniform bill of lading, or to pay the 10 per cent. higher rate for not accepting it, take his stand upon the broad provisions of the law, and thereby once more relegate to the courts the entire question of the liability of carriers for loss and damage. The only way this question can be certainly, finally and satisfactorily settled is for Congress to pass an act making the uniform bill a part of the Interstate Commerce law. The need for such legislation is shown by the history of the bill of lading controversy and by existing conditions.

Formerly shippers often offered to assume the entire risk of loss or damage to shipments in return for reductions in the rates upon their commodities; and prior to 1904 there were in the classifications numerous articles that purported to be carried at owners' risk. But when such goods were lost or damaged, shippers usually sent in claims, which, owing to competition between the carriers, commonly were allowed. Finding they had got little in return for the reductions in rates they had made, the carriers, late in 1903, and early in 1904, adopted a uniform bill of lading the sweeping conditions of which exempted them from almost all liability unless the shipper paid a rate 20 per cent. higher than the published tariff. Shippers complained to the Interstate Commerce Commission. The Commission referred the matter to a conference committee of shippers and eastern railroad traffic officers. While the committee was at work Congress passed the Hepburn act. Meantime, the railroads continued to print in their bills of lading and classifications the provision that goods not carried subject to the bill of lading would be charged 20 per cent. extra. Claims usually have been settled as if this provision did not exist. If the provision was legal it was a violation of law to publish and not enforce it; if it was not legal it was illegal to publish it at all. In either case the law has been disregarded by railroads, shippers and the Commission. As neither the common law nor the federal statutes have clearly defined the rights of the shipper and carrier, each has claimed more than he was entitled to in order not to get less than was his due.

The new uniform bill of lading defines the general liability of the carrier clearly and in a way that is fair to both rail-

road and shipper. The carriers are made responsible for all loss or damage not caused by the act of God, by the public enemy, by quarantine, by the law, by the act or default of the shipper, by differences in grain weights due to shrinkage in the commodity or discrepancies in elevator weights, or by strikes or riots, except when goods are hauled in open cars. They assume liability for loss by fire whether goods are in closed or open cars, a liability they have always sought to avoid. Their responsibility as carriers continues 48 hours after notice of arrival of the goods, after which it becomes the liability of warehousemen only. Of course, technically, the carriers are liable only for loss or damage caused by their negligence; but as, instead of imposing upon the shipper the burden of proving the carrier's negligence, as has been done in the past, the new uniform bill of lading specifically imposes upon the carrier the burden of proving its freedom from negligence, the shipper will gain a very great advantage in settling claims.

Despite the manifest advantages it gives to them as compared with the present one, shippers have made various objections to the new bill of lading. Some protest against the provision in the classifications that a 10 per cent. higher rate will be charged for goods not shipped subject to the bill of lading. But this seems reasonable. If the railroad assumes any heavier liability than that fixed by the bill of lading, it will act as an insurer as well as a carrier, and should be compensated in both capacities.

It is also objected that the complete responsibility of the initial carrier to the shipper is not unqualifiedly recognized. The bill of lading provides that no carrier shall be liable for loss or damage off its own rails, "except as such liability is or may be imposed by law." Counsel of the railroads believe the part of the Hepburn act making the initial carrier entirely responsible to the shipper for a through shipment, regardless of where loss or damage may occur, is unconstitutional. The representatives of the roads on the uniform bill of lading committee therefore insisted that the responsibility of the initial carrier should not be fixed in accordance with the Hepburn act by the contract in the bill of lading, but should be left open to be settled by probable future litigation. The bill is not contrary to law. It is, and will be, in accordance with law, no matter what the courts may finally say the law is.

Another objection raised is to the requirement that claims must be made within four months. This does not seem unfair. It is said that the statute of limitations should apply to claims as to any debt. But may not the carrier and the shipper voluntarily contract themselves (or be legislated) out of the statute of limitations? Since the bill of lading puts on the carrier the burden of proving its freedom from negligence, the shipper, it would seem, may fairly be required to present his claim promptly, so that the road may have a fair chance to look up all the evidence in its favor while the facts are ascertainable. Shippers complain a great deal about railroads being slow to settle claims, and they should be willing to submit to a requirement that they shall be promptly presented.

Protest is also made against the provision that claims must be presented at the point of origin or destination of the shipment. Probably it would have been better to have provided that they should be presented to the initial or final carrier, for this is practically what is meant. Still another objection raised is to the exception of the carrier from liability for natural shrinkage of grain and for discrepancies in elevator weights; and it does seem that whether a difference in weights in any given case is due to either of these causes is a question of fact, which should be settled by evidence rather than by a general rule.

That several objections, some of them apparently valid, have been raised against the new bill of lading does not show it is not a good bill. No doubt it is imperfect. It will in some instances work hardships upon the carriers, in others upon shippers, in others upon the banks. But, being the product of four years' hard work by some of the ablest railroad men and

shippers of the country, aided by the Interstate Commerce Commission and representatives of the American Bankers' Association, the fact that fault can be found with it, shows pretty conclusively that no bill of lading can ever be formed with which fault cannot be found. It is the best thing now attainable. Its adoption by law would be better for both railroads and shippers than to leave their respective rights, now in a state of great uncertainty, to be settled by prolonged and costly litigation. If Congress made the new bill of lading a part of the law of interstate commerce, probably many of the legislatures would apply it to intrastate commerce, thus introducing order and uniformity in place of existing confused and conflicting State statutes. If railroads, shippers, bankers and the Interstate Commerce Commission, after having jointly framed the uniform bill of lading shall appear before Congress and together urge its enactment into law, they will have afforded an example of sensible and wholesome co-operation, such as is too seldom seen.

#### CHICAGO, ROCK ISLAND & PACIFIC.

In the review of the operation of this company for the fiscal year ended June 30, 1907, the *Railroad Gazette* said: "It is evident that the Rock Island has now reached the point where its maintenance expenditures are not only fully taking care of the current depreciation of the property, but making up for insufficient maintenance expenditures in the past. There is still a great deal of work to be done. Every added year of prosperity during which the present liberal maintenance standard can be maintained will mean much in the future history of the company." But last year was not one of prosperity, and notwithstanding a decrease of nearly 3 per cent. in gross revenue, the company was unable to hold down operating expenses, which increased nearly 4 per cent. More unfortunate still, the greatest increase in operating expenses was in conducting transportation. The difficulties that the company labored under in this respect are strikingly shown by the increase in empty freight car movement, an increase of about 23,000,000 miles. The number of empty cars per train was 7.20 last year, as compared with 5.65 the year before, an increase of 28 per cent. At one time it was said that solid trains of empty cars were delivered to the Rock Island to be hauled free, since they were being returned to their owners, and not only did the Rock Island have to haul these cars at a dead loss, but it had to repair them in transit.

Transportation expenses last year were \$23,655,278, an increase of nearly 9 per cent. The items under this account in which the company was able to make a saving are almost negligible, while the increases in some items are startling. For instance, engine house expenses (road) were \$831,025 last year, an increase of 14 per cent., and engine house expenses (yard) were \$196,613, an increase of a little less than 23 per cent.; damage to stock and right of way cost \$142,109, an increase of 31 per cent., while injuries to persons cost \$834,476, an increase of nearly 32 per cent. The company was unable to cut down the scale of wages or to reduce its operating force, so that road trainmen, for instance, were paid \$2,790,000 last year, an increase of 5 per cent., and road enginemen were paid \$2,744,944, an increase of about 2 per cent. It must be remembered, however, that in 1907 transportation expenses had been cut down very materially from 1906, so that the figures for 1908 make a very much worse showing when compared with 1907 than they would if compared with a five or 10-year average.

During the last five years the funded debt of the company has grown rather faster than either its mileage or its gross or net earnings. Taking 1903, since that was the first year in which equipment trust notes and bonds in the treasury were not included in the amount of funded debt shown as outstanding, we find that the outstanding funded indebtedness of the company was \$133,658,000 as compared with \$189,159,000 last



year. This is an increase of 29 per cent. The average mileage owned in 1903 was 6,319 miles as compared with 7,074 miles last year, an increase of 12 per cent. At the same time the interest on funded debt increased from \$6,034,645 to \$8,227,062, an increase of 37 per cent. Gross earnings were \$44,376,619 in 1903 as compared with \$58,484,197 last year, an increase of 32 per cent.; but net earnings were \$16,155,449 last year, a decrease of a little less than 1 per cent. from the 1903 figure. In the case of net earnings, however, the comparison is unfair since 1903 was an unusual year in this respect, and it is more fair to compare 1904 with last year. This comparison shows an increase of 21 per cent. But this increase in funded debt has not been too great to be carried, as shown by the fact that the annual interest charges last year, per mile of line owned, were \$1,163, while net operating revenue per mile of line was \$2,027, in spite of the hard times.

Total operating revenue was \$54,484,197 last year, a decrease

extent of 2,376,061, or an average of 315 per mile of main and second track, and of these ties, 927,662 were treated. The expenditure on ties was \$1,264,365, an increase of 13 per cent. over the large expenditure of last year. In 1907 an extraordinarily large sum was spent for new rails, so that last year it was possible to make a considerable saving here, \$143,327 being spent in 1908, a decrease of 63 per cent. Of the total main, second and third track owned or leased June 30, 1908, 44 per cent. was laid with 80 lb. rails or heavier, and 34 per cent. with 60 or less than 60 lb. rails. Of this track 17 per cent. is ballasted with rock, 29 per cent. with gravel, and 41 per cent. with sand or dirt.

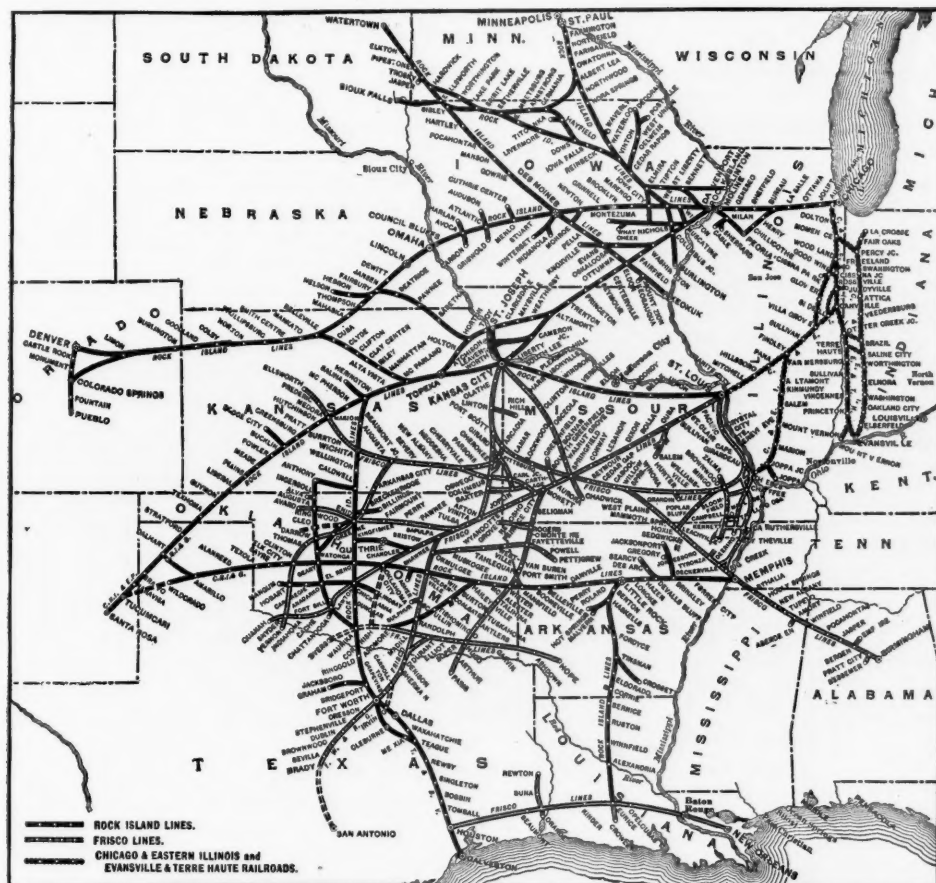
The average expenditure for maintenance per locomotive owned was \$2,300 as against \$2,459 in 1907. The company has, however, acquired 160 new locomotives in the last two years. Maintenance per passenger car cost \$703 last year as compared with \$867 in 1907, and maintenance per freight car cost a little

less than \$70 per car as compared with less than \$57 per car in the previous year.

Bituminous coal, which in 1907 furnished nearly 20 per cent. of the total tonnage carried, gave a slightly smaller proportion in 1908, and the actual bituminous tonnage was 2,915,168; a decrease of 15 per cent. from the previous year. The commodity which furnishes the next greatest per cent. of tonnage is lumber, of which 1,654,957 tons were carried last year, a decrease of 7 per cent. Unlike the majority of roads, the Rock Island lines carried 5 per cent. less products of agriculture in 1908 than in 1907, the tonnage of wheat, other grain, and cotton each decreasing 20 per cent. or over. The tonnage of corn on the other hand was 1,104,784 tons, an increase of about 14 per cent. In general, the tonnage of nearly all commodities decreased.

The balance sheet shows an increase in funded debt of \$6,268,000, \$7,782,000 first and refunding mortgage bonds having been sold and \$1,494,000 gold bonds of 1902 having been retired and \$20,000 Little Rock Bridge Company's bonds having been retired. Of the first and refunding mortgage bonds, \$4,606,500 are held in the treasury and pledged against notes payable, this block of bonds being carried as a current asset on the balance sheet. Cash on hand amounted to \$2,485,736 as compared with \$9,917,499 on hand June 30, 1907, but current assets as a whole were \$38,210,588 last year, an increase of \$3,808,598, while current liabilities were \$15,273,329, an increase of \$1,270,071. The \$6,000,000 collateral trust notes due April 1, 1908, and secured by \$7,500,000 first mortgage bonds of the Rock Island, Arkansas & Louisiana Railroad Co., were extended for one year at 6 per cent., and \$1,500,000 additional R. I. A. & L. bonds were issued and added to the security of the notes.

Construction of new line went on as was planned at the beginning of the year, and the line from Irving, Tex., to Carrollton was almost finished. There were established along the line of the Rock Island, 290 new industries. This has an important bearing on the future of the company, as a specific instance of the rapidity with which the Southwest is growing. Recovery has been rapid in that country, and the Rock Island lines are now showing gains, both gross and net, over the earnings for the corresponding fall weeks in 1907.



Rock Island Company's Lines.

of nearly 3 per cent., or \$1,654,476. Freight revenue amounted to \$37,899,356, a decrease of \$2,316,545, or nearly 6 per cent. There were 15,877,646 tons of freight moved, a decrease of 1,534,687 tons from the previous year, the revenue per ton-mile remaining the same in both years, while the average haul per ton was 253 miles last year, an increase of a little over seven miles. The number of passengers carried last year amounted to 16,960,747, an increase of 1,578,348, the revenue per passenger mile decreasing from 2.23 cents to 1.89 cents, and the average distance each passenger was carried was 52 miles last year, an increase of nearly five miles; so that passenger density last year was 110,670, an increase of 17,455.

In regard to expenses, the accounts under conducting transportation have already been mentioned. In maintenance of way and structures the company made a saving, the maintenance of way expenditures being \$8,319,804, a decrease of 9 per cent. This is an average expenditure per mile of main and second track owned and leased of \$1,044, as compared with \$1,164 last year. Under this head ties were renewed to the

The following table shows the operating results for the last two years, the figures for 1907 having been rearranged to correspond to the form prescribed by the Interstate Commerce Commission:

	1908	1907.
Average mileage operated . . . . .	7,970	7,780
Freight revenue . . . . .	\$37,899,356	\$40,215,901
Passenger revenue . . . . .	16,693,110	16,153,539
Total operating revenue . . . . .	58,484,197	60,138,673
Maint. way and structures . . . . .	8,319,804	9,146,540
Maint. of equipment . . . . .	7,490,382	6,963,277
Traffic . . . . .	1,488,115	1,610,429
Transportation . . . . .	23,655,278	21,719,981
Total operating expenses . . . . .	42,328,748	40,812,822
Taxes . . . . .	1,789,895	1,676,038
Net operating revenue . . . . .	14,365,554	17,649,813
Gross income . . . . .	14,686,756	18,263,421
Net income . . . . .	4,718,102	8,750,517
Dividends . . . . .	3,929,785	4,116,728
Surplus . . . . .	788,317	4,633,789

#### ST. LOUIS & SAN FRANCISCO.

On June 30, 1907, the St. Louis & San Francisco was building lines that aggregated 303 miles. During the past year there have been only two miles added to the average mileage operated, and the annual report for the fiscal year ended June 30, 1908, shows that the lines now building aggregate 356 miles of first main track. The inability of the company to carry on and complete the construction work was particularly unfortunate, since much of the new line, when completed, will give the system new main routes which should be particularly profitable. It should be noted that in the lines shown as under construction, that of the Colorado Southern, New Orleans & Pacific from Opelousas, La., to the Texas state line, 102 miles, and from Crowley, La., to Eunice, 22 miles, was in operation pending completion of construction on June 30, but is not included in average miles operated.

The fact that stockholders during the past year have authorized a mortgage securing \$115,000,000 bonds, of which \$17,509,044 have been issued, but all of which are still owned by the company, gives the key to the present situation of the Frisco. If the company could sell its bonds the outlook for next year would be promising indeed. It has the bonds and it has completed work for which these bonds are properly issued, but as long as it cannot dispose of them it has no way of reimbursing itself for work already completed or of acquiring capital to carry on construction now under way.

The balance sheet shows that cash on hand and in the hands of fiscal agents amounted to \$2,661,981 on June 30, a decrease of \$592,604, and current assets; including supplies on hand valued at \$3,986,304, and advances account of construction, fundable, \$3,597,625; amounted to \$36,324,780; but this includes \$21,545,686 of securities in the treasury, so that strictly current assets amounted to but \$7,194,967, while current liabilities were \$21,184,700, an increase of \$7,559,927. The single item audited vouchers and payrolls, amounted to \$5,374,339, an increase of \$1,263,454. The amount of notes payable more than doubled during the year and reached \$11,987,036 on June 30. The St. Louis & San Francisco has plenty of assets, but the difficulty is to dispose of them advantageously.

The Frisco was even harder hit by the business depression last year than the Rock Island, and it had the same difficulties with its transportation expenses. The total operating revenue was \$35,806,132, a decrease of 6 per cent. from 1907, while net operating revenue amounted to \$10,713,207, a decrease of 20 per cent. The very fact that 1907 was an unusually prosperous year, and that transportation expenses especially showed large decreases from the previous year, makes the comparison between 1908 and 1907 look rather unfairly black for last year.

Both freight and passenger earnings decreased, but in the case of freight this decrease in earnings corresponded to a decrease in the number of tons carried, while in the passenger department the number of passengers carried one mile totaled

414,178,289, an increase of 16 per cent., the decrease in passenger revenue of \$239,290 being caused by the compulsory reduction of rates in many states. The average rate per passenger per mile last year was 2.15 cents, being 15 per cent. less than the average rate collected in the previous year. The passenger business of a railroad is generally far less profitable than its freight business, so that the large increase in the volume of this business and decrease in the rate received per unit may quite probably account for a considerable part of the increase in transportation expenses. The freight train mileage last year was 11,173,792 miles, a decrease of 14 per cent., but the passenger train mileage was 8,985,918 miles, an increase of 25 per cent.

There were 15,275,619 tons of revenue freight carried last year, an increase of 878,535 tons, and at the same time the average haul per ton decreased from 164.5 miles to 161.4, and the average revenue per ton per mile decreased from 1 cent to .97 cents. The decreases in tonnage of some of the commodities carried were so great that the general hard times fails to explain them. There were 335,746 tons of wheat carried last year, a decrease of 31 per cent., and the tonnage of products of agriculture decreased by 17 per cent. The decrease in tonnage of packing house products other than dressed meats amounted to 44 per cent., and of animals and animal products as a whole to nearly 9 per cent. It is rather unusual to note that products of forests increased 4 per cent., being due to an increase of 25 per cent., in products of forests other than lumber. Bituminous coal, the tonnage of which forms about 31 per cent. of the total number of tons carried, decreased but a little over 4 per cent.

Expenses for maintenance were rigidly held down during the last year, the expenditure for maintenance of way showing a decrease of nearly 14 per cent., and expenditure for maintenance of equipment decreasing over 2 per cent. In detail the average expenditure per mile of road on maintenance of way was \$952 last year as compared with \$1,068 in 1907 and \$799 in 1906. The unit costs of repairs of equipment were as follows: \$2,205 per locomotive in 1908 as against \$2,508 on the preceding year; \$686 per passenger car as compared with \$781 in 1907, and \$54 per freight car as compared with \$62 in the previous year. The rolling stock of the company, however, was increased during the year by the addition of 44 locomotives, 75 passenger cars and 3,282 freight cars, and since the equipment increased to about as great an extent in the previous year, the average expenditure for maintenance while not large may be perfectly adequate since there is so much new equipment on the lines.

Like the Rock Island, the Frisco could not make a saving in most of the items that go to make up transportation expenses. The amount of wages paid increased from 5 per cent. in the case of station employees to 15 per cent. in the case of crossing flagmen and gatemen, most of the increases being about 5 per cent., although the wages of yard conductors and brakemen showed a decrease of a little less than 2 per cent. The increases, of course, are primarily due to the general upward movement prior to the panic. Many of the 1906 and 1907 increases were made too late to show their full effect in the previous fiscal year. Loss and damage to freight amounted to \$679,986, an increase of 33 per cent., and loss and damage to baggage amounted to \$23,740, an increase of 122 per cent. On the other hand, injuries to persons cost \$335,930, a decrease of 17 per cent.

The current problem of a road like the St. Louis & San Francisco, which operates in a country growing rapidly, and with great natural resources as yet but slightly developed, is simply one of tiding over hard times until the certain return of prosperity. If the arrangement by Kuhn, Loeb & Co., New York, for meeting the St. Louis & San Francisco notes, amounting to \$7,100,100, due December, 1908, means that these bankers are to finance the needs of the Frisco when the bond market is favorable for selling such securities, as the Frisco



has to offer, the hardest problem of the company should be solved.

The following table shows the results of operation for the last two years, the figures for 1907 having been rearranged to correspond to the form prescribed by the Interstate Commerce Commission:

	1908.	1907.
Average miles operated.....	5,064	5,062
Freight revenue.....	\$23,976,297	\$26,534,640
Passenger revenue.....	8,927,037	9,166,327
Total operating revenue.....	35,806,132	38,253,981
Maint. of way and structures..	4,822,333	5,584,889
Maintenance of equipment.....	4,607,462	4,715,225
Traffic.....	833,825	873,974
Transportation.....	13,746,380	12,709,598
Total operating expenses.....	25,092,925	24,856,575
Taxes.....	948,415	896,958
Net operating income.....	9,764,793	12,500,448
Gross income.....	11,313,350	14,373,639
Net income.....	459,066	4,158,583
Dividends.....	199,742	199,742
Surplus.....	259,324	3,958,841

## Contributed Papers.

### TRAIN ACCIDENTS IN SEPTEMBER.

Following is a list of the most notable train accidents that occurred on the railroads of the United States in the month of September, 1908. This record is intended to include usually only those accidents which result in fatal injury to a passenger or an employee or which are of special interest to operating officers. It is based on accounts published in local daily newspapers, except in the cases of accidents of such magnitude that it seems proper to write to the railroad manager for details or for confirmation.

#### Collisions.

Date.	Road.	Place.	Kind of Accident.	Train.	No. persons reported— Kil'd. Inj'd.
2.	C. R. I. & Pac.	Chickasha.	xc.	Ft. & Ft.	3 0
4.	Bost. & Maine.	Lawrence.	xc.	Ft. & Ft.	3 1
5.	Nor. Pacific	Plains.	bc.	P. & Ft.	9 2
10.	Lk. Sh. & M. S.	Adrian.	rc.	Ft. & Ft.	2 3
11.	Pitts. & Lk. E.	Youngstown.	xc.	P. & Ft.	1 0
14.	Lk. Sh. & M. S.	Chesterton.	rc.	P. & P.	1 28
14.	Southern	Manassas.	bc.	Ft. & Ft.	0 5
17.	Ann Arbor	Mt. Pleasant.	bc.	Ft. & Ft.	1 4
17.	Erie	Kennedy.	rc.	Ft. & Ft.	1 0
17.	Pitts. & Lk. E.	Gibson.	xc.	Ft. & Ft.	1 7
17.	Bess. & L. E.	Meadville Jn.	rc.	Ft. & Ft.	1 2
21.	Mo. Pacific	Weeping Water.	bc.	P. & Ft.	0 38
22.	Erie	Horseheads.	rc.	Ft. & Ft.	2 2
25.	Nor. Pacific	Young's Point.	bc.	P. & Ft.	23 12
25.	Colo. & So.	Cucharas Jn.	xc.	Ft. & Ft.	2 1
29.	Union Pacific	Kearney.	xc.	P. & P.	0 5

#### Derailments.

Date.	Road.	Place.	Cause of derlmt.	Kind of train.	No. persons reported— Kil'd. Inj'd.
1.	Bost. & Maine.	Waltham.	unx.	Ft.	1 0
2.	Del. & Hud.	Sidney.	exc. speed.	Pass.	0 2
2.	Southern	Scotland, Ga.	unx.	Ft.	1 1
5.	Chic. & N. W.	Langley.	ms.	Ft.	1 2
10.	Lehigh Valley	Perth Amboy.	unx.	Ft.	1 0
13.	Lk. Sh. & M. S.	Huron.	unx.	Ft.	2 1
13.	Erie	Geneva.	ms.	Pass.	0 12
14.	Yazoo & M. V.	Clarksdale.	d. track.	Pass.	4 26
16.	Mo., K. & Tex.	San Marcos.	d. track.	Pass.	0 20
19.	C. R. I. & Pac.	Searcy.	ms.	Pass.	0 4
19.	Ches. & Ohio	Lanexa.	unx.	Pass.	1 4
19.	Int. & G. Nor.	Kyle.	unx.	Pass.	1 12
20.	Kan. C. South.	De Queen.	d. track.	Ft.	3 0
23.	Balt. & Ohio	H. de Grace.	d. bridge.	Ft.	0 1
24.	St. L. & S. F.	Carthage.	unx.	Pass.	2 1
24.	Southern	Duncan.	ms.	Pass.	2 4
28.	Ill. Cent.	Dwernon.	ms.	Pass.	1 2

#### Other Accidents.

Date.	Road.	Place.	Cause of accident.	Kind of train.	No. persons reported— Kil'd. Inj'd.
2.	Den. & Rio Gr.	Thompson's.	boiler.	Pass.	0 2
3.	A., T. & S. F.	Kadrow.	boiler.	Ft.	2 1
7.	S. A. & A. P.	Yokum.	boiler.	Ft.	2 1
15.	Mo., K. & Tex.	Windsum.	explosion.	Ft.	5 20
27.	C., M. & St. P.	Portage.	boiler.	Ft.	2 1

The collision at Plains, Mont., on the 5th, is said to have

<sup>1</sup> Abbreviations and marks used in Accident List:  
rc, Rear collision—bc, Butting collision—xc, other collisions  
—b, Broken—d, Defective—unf, Unforeseen obstruction—unx, unexplained—derail, Open derailing switch—ms, Misplaced switch  
—acc. obst., Accidental obstruction—malice, Malicious obstruction  
of track, etc.—boiler, Explosion of boiler of locomotive on road—  
fire, Cars burned while running—P., or Pass., passenger train—F., or Ft., freight train (includes empty engines, work trains, etc.)—As-  
terisk, Wreck wholly or partly destroyed by fire—Dagger, One or more passengers killed.

been due to the non-delivery of a train order. Of the nine persons killed, four were trespassers. The passenger train was running at high speed at the time of the collision. A coroner's jury held that the operator who received an order for the passenger train after it had passed his station, was ignorant of the rules; that the train despatcher violated the rules, and that blame was also attributable to a former chief despatcher, who had employed incompetent operators; and, finally, the company is charged with negligence in keeping incompetent men in responsible positions.

The collision at Chesterton, Ind., on the 14th, is said to have been due to disregard of an automatic block signal, the atmosphere being filled with dense fog and smoke at the time.

The collision at Young's Point, Mont., on the 25th, resulted in the death of 21 passengers. In this case an eastbound passenger train, running at regular speed, collided with a west-bound freight. The smoking car in the passenger train was telescoped by the baggage car ahead of it and most of the victims were in the smoking car. The line at the point where the collision occurred is straight for 1½ miles, but there was a blinding snowstorm, which appears to have prevented the enginemen from seeing far ahead. The freight train was encroaching on the time of the passenger train without authority. A flagman had been sent ahead, but he had not gone far enough to furnish adequate protection.

In the derailment at Clarksdale, Miss., on the 14th, in which four passengers were killed, two passenger cars were overturned and fell down a bank. The reports say that the roadbed had settled so as to make a low place in the track.

The train derailed at Searcy, Ark., on the 19th, consisted of a single motor car. The car was badly wrecked.

The derailment at Havre de Grace, Md., on the 23d, was accompanied by a notable bridge disaster, but the cause has not been cleared up. The bridge, about 75 ft. above the Susquehanna river, is being rebuilt and enlarged, and the part that failed consisted of temporary plate girders resting on temporary wooden piers. About 600 ft. of this structure fell, causing a great loss, and compelling a diversion of all trains to the Pennsylvania Railroad for about seven miles for many days. The person injured was a watchman in charge of the bridge. It was reported that the structure had been tampered with by enemies of the bridge company, dynamite having been found around the structure, but there appears to be no satisfactory basis for this theory. The testimony of eyewitnesses affords little information. A car in the middle of the train may have run off the track and in dropping to the floor so disturbed the traveler as to cause it to fall, but the train was moving very slowly and as yet no evidence has been found. The traveler used in erecting the new trusses was 104 ft. high, and the first trouble was immediately under it.

Of the 14 serious electric car accidents which we find in the newspapers in the month of September, five are reported as resulting fatally to one or more persons, and the total number of fatalities is eight. The number of persons reported injured in these five accidents was 89.

### FOREIGN RAILROAD NOTES.

Of the 22 "directories" into which the Prussian State Railroads are divided, no less than nine have lost their presidents within 12 months, four by death, the others retired on account of age or ill health.

A railroad clerk named Schneider, employed in the freight office at Karlsruhe, wrote a paper on the relations between the railroads and agriculture in the Grand Duchy of Baden, which was so highly regarded that the University of Freiburg gave him an honorary doctor's degree, though Schneider had no academic education. This is a very rare thing for a German university to do.

## THE GROWTH OF THE ANGLE BAR.

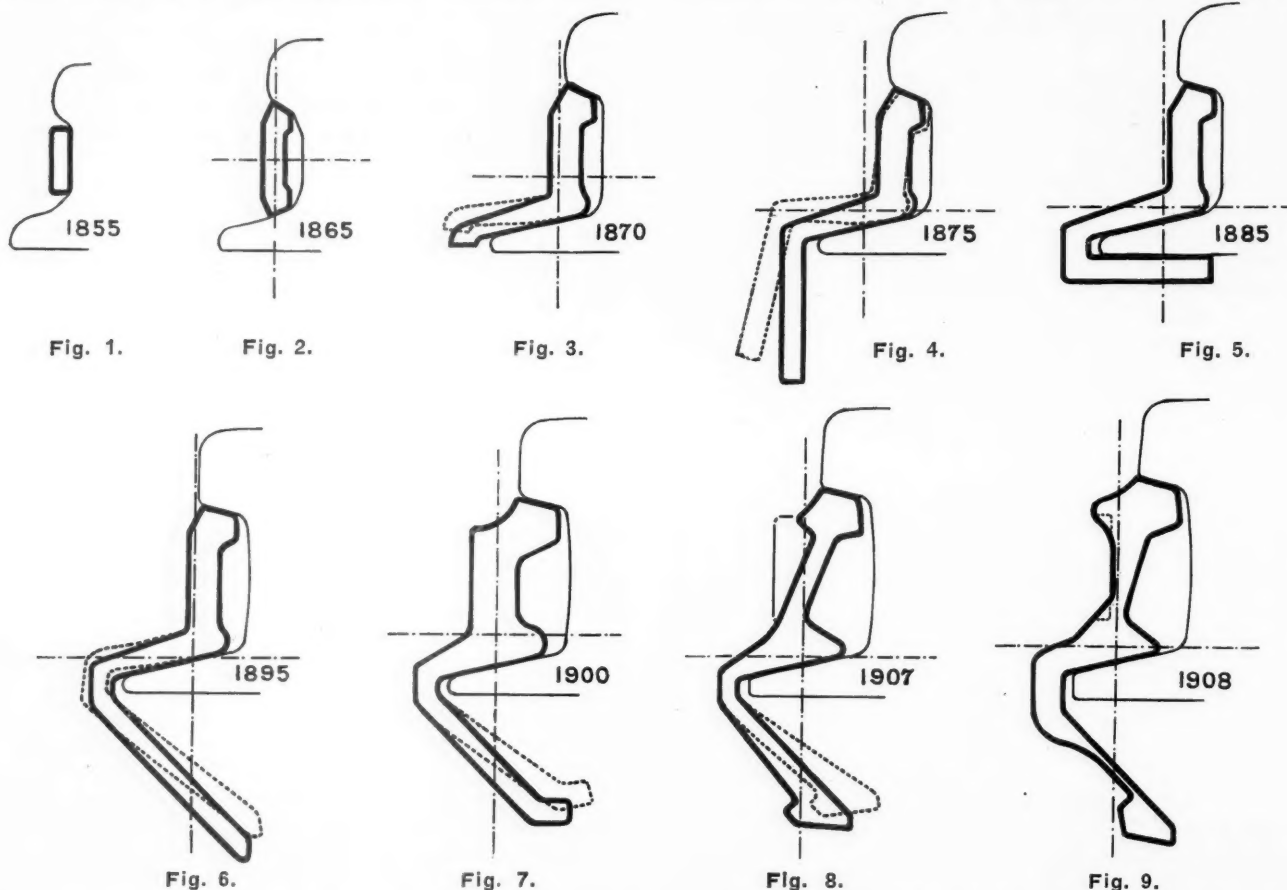
BY M'LEOD THOMSON.

The development of the angle bar may be shown to advantage by illustration. The accompanying series of figures show the progress and some new patterns which are thought to embody the most recent ideas.

In the early stages during the transition from the bull-head rail to the T-rail, the plain strap bar, as shown in Fig. 1 was used. Stiffness of the bar was not yet a consideration, since no effort was made to fit the bar to the head and to the foot of the rail. It was bolted tightly against the rail web and its principal function was to keep the rail ends in line and to prevent them from pulling away from each other. With the use of this bar the objectionable slotting of the rail foot was eliminated and holes were drilled through the rail webs. This flat bar was a step from the supported to the suspended joint

it was here that the trouble began. Metal had to be added, but it could not be so favorably placed, nor could its stiffness per unit area of cross section be as little as that of the metal used in the plain upright bars. An angle bar was the only way out of the difficulty, and this was made by adding the outwardly extending flange, as shown in Fig. 3. With this design the greatest stiffness obtained was about 30 per cent. of the stiffness of the rail. The difficulties in the way of adding metal more advantageously, and thus improving this first type of angle bar, may be appreciated when we realize that it has prevailed almost unchanged for more than thirty years, and that it is only within the last few years that it has been to a great extent superseded by the deeper girder forms.

To get a proper idea of this development of the angle-bar, one mechanical principle must be held uppermost in mind. When a splice bar composed of members extending at angles to each other and held to the rail by bolts only through the



and it took the place of the cast chairs which rested on the tie and in which the rail ends fitted.

It soon became apparent that some stiffness was required at the rail joint, and about 1865 the splice plates were made deeper and their upper and lower edges were fitted to the head and to the foot of the rail, as shown in Fig. 2. This permitted the plates to carry part of the load and the change gave better results; but the under side of the pear-shaped rail-head in use at that time was at an angle of about 60 deg. from the horizontal, which resulted in too much strain being thrown on the bolts. This angle was changed to about 22 deg. on rails rolled later, but was afterwards changed again to 30 deg., on account of the difficulty found in rolling. It then gradually diminished to the 13 deg. and 15 deg. angles prevailing to-day. The reduction of this angle made it possible to design a pair of bars of this type which had about 20 per cent. of the stiffness of the rail. The metal in them was economically distributed for stiffness and was located nearly symmetrically with reference to their horizontal and vertical neutral axes.

Increasing loads made still greater stiffness necessary and

upright member between the fishing angles is subject to a vertical load, any member of it lying in a plane at an angle to the vertical, such as the foot of the ordinary angle bar, has a tendency to spring or buckle to the position in which it will have the least stiffness and therefore bend the easiest. This of course is the horizontal position. In other words, all members of the bar lying at an angle to the vertical will tend to close up to the horizontal position under a vertical load. For a given load, this buckling tendency increases as the direction in which the bar extends approaches the horizontal, and the amount of buckling depends largely on the length of the member and on the fillet or disposition of metal at the outer edge of the bar, which acts as a brace to prevent such buckling. However, the fact that the member buckles at all means that the metal on the opposite side of the buckling point from the main vertical position of the bar is of very little use for stiffness and might just as well be eliminated, as far as this feature is concerned.

Referring to the accompanying figures, the dotted lines show the positions, somewhat exaggerated, which the members of



the bars assume under vertical load. The figures also show the positions of the vertical and horizontal neutral axes as affected by the various additions of metal. It is desirable to have the vertical neutral axis located inside of the face of the bar gripped by the bolts, in order that there may be no cross strains on the bolts; also, the centre of gravity of the bar should be as close to the rail as possible. The addition of the foot to the angle-bar pulled the vertical axis away from the rail further than the position it occupied in the plain plate, but not sufficiently to make any practical difference.

Referring again to Fig. 3, it will be noted from the position

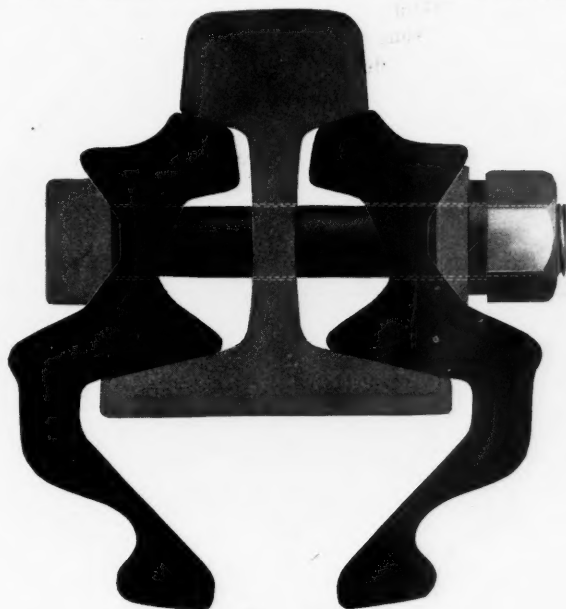


Fig. 10.

of the buckled member shown dotted that the metal in the outer edge of it, which should be the most efficient for stiffness on account of its being the greatest distance from the horizontal axis, is really the least efficient, since it is outside of the buckling point.

As early as 1875, extended tests were made in Europe to obtain a form of bar that would have stiffness equal to that of the rail. The girder-form shown in Fig. 4 was tried. The addition of the girder member gave a pair of bars with a relative stiffness of about 70 to 75 per cent., which was about double the relative stiffness of the plain angle bar. By the addition

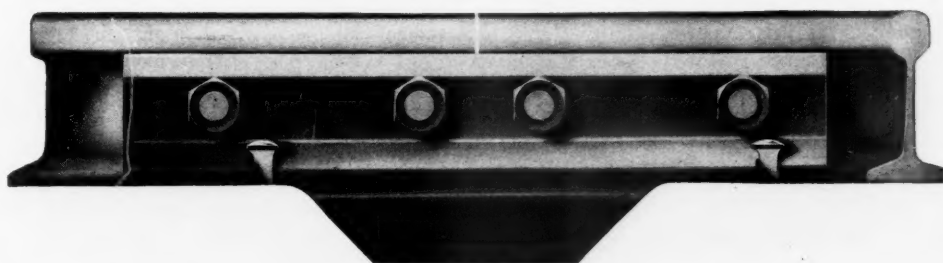


Fig. 12.

of large masses of metal to prevent buckling, bars of this type were made as stiff as the rail, but even with the buckling eliminated, the design did not prove to be a happy one. The addition of the lower flange pulled the vertical axis of the bar out beyond the face gripped by the bolts. This created resisting stresses in the bar, which, together with the bearing the flange took in frozen or other unyielding roadbed, created a constant tendency for the bar to assume the position shown in dotted lines. The buckling tendency characteristic of the angle-bar shown in Fig. 3 was also present in this type and the bearing of the girder flange on the roadbed increased the buckling action. The resulting cross strains

on the bolts were very objectionable and the joint lost a large part of its stiffness because of imperfect fitting of the bars.

About 1885, another attempt was made to improve the angle-bar by adding a horizontal member extending under the rail base, as shown in Fig. 5. This change evidently was not made with stiffness alone in view, since the flat base flange placed at right angles to the load stresses is in its most unfavorable position. The effort was more to provide a suspended rolled bar having a base support somewhat similar to the cast chairs used in the earlier days. The principal advantage of the base member was to hold down the outer

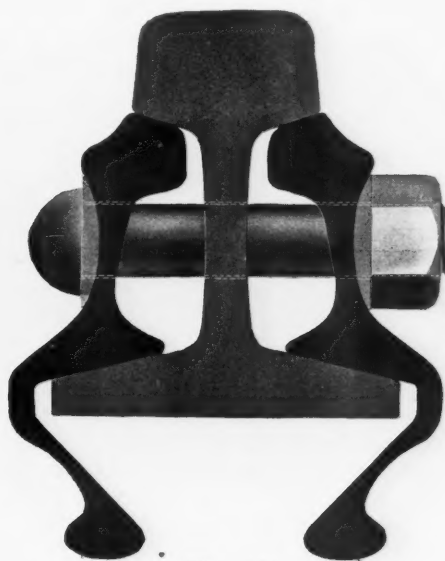


Fig. 11.

edge of the upper portion of the bar and thus somewhat increase its outer stiffness by preventing the buckling. An attempt was made to make this design of bar, as well as the girder form shown in Fig. 4, equal in stiffness to that of the rail by adding a large mass of metal around the rail base; but this method when followed out in this base supported form proved to be more harmful than beneficial, since the rigidity of the jaws pinched off the rail flanges and since the heavy mass of metal acted as an anvil under the rail ends, which caused excessive battering of the rail-head. Consequently, in the later patterns of this type of bar, its

members were made lighter and sufficient stiffness was sacrificed to overcome the other defects and to reduce the cost of manufacture.

About 1895, a bar was designed having an inwardly extending girder flange as shown in Fig. 6. The idea was to keep the vertical neutral axis of the bar inside of the face gripped by the bolts, and also to cause the girder to buckle or spring upwardly and inwardly sufficiently to counteract the upward

buckling of the member fitting the top of the rail base. The design proved to be a good one in that it partially fulfilled both of these requirements and consequently provided the 100 per cent. stiffness with very much less metal than the former types, and with less of the other objectionable features as well. The bar under load has a tendency to assume the position shown in dotted lines. An attempt was then made to eliminate all of the buckling above the rail base and thus get more stiffening effect from the girder member. This was done by providing a heavy upper member and by spacing it at a greater distance from the rail, in order to shorten and thicken the outwardly extending member, as shown in

Fig. 7. This proved to be a very efficient design of 100 per cent. strength, but the upper portion was necessarily heavy; this added considerably to the cost of manufacture, and the large mass of metal caused battering.

Within the last two years, a bar with a light upper portion has been designed, which eliminates the buckling as efficiently as the heavy top portion shown in Fig. 7. A comparatively light slanting web member is used, as shown in Fig. 8. A vertical outer face for the nuts was provided by a small bevel washer at each bolt, or the slanting face of the bar was milled enough to make the vertical outer face, in which case a thicker web was used.

Still further improvements in detail were made last year. They are shown in Fig. 9, and also in Figs. 10, 11, 12 and 13. These show comparatively light bars in which almost all the buckling is eliminated, making their stiffness proportional to their moments of inertia. It is this buckling feature that has upset the calculations of many who have figured the stiffness of various rail joints as proportional to the moments of inertia of the cross sections of the bars. It must be apparent, to all who have considered this matter carefully, that this relation between the moment of inertia and the cross-section does not hold good when there is any buckling action present. A bar in the form of a Z might have a relatively high moment of inertia with reference to its horizontal neutral axis, but such a bar would very easily collapse under a vertical load. The T-rail or I-beam is a good example of metal distributed in such a way that nearly all of it exerts its greatest efficiency for stiffness, and it is this T-rail idea that has recently been applied to the splice bar.

In the patterns of bars shown in the last five figures, the effort has been to make every ounce of metal count, reducing the metal and therefore the cost of the bars to a minimum, and yet retain the required stiffness and resiliency. It has been proven during this last year that a considerable amount of metal could be saved by reducing the thickness of the upper web and the thickness of the depending flange, as shown. Tests have shown that these portions could be reduced to  $\frac{3}{8}$  in. and  $\frac{1}{4}$  in. respectively, without perceptibly affecting the stiffness of the bar. In fact, on a test machine, bars with reduced sections showed a rather more favorable deflection curve than similar bars which did not have their sections reduced.

The recent effort and activity along these lines has been to produce a bar which will have all of its parts taxed to the maximum, and which will fall all over at one time. Such a bar would have no weak link and would be the strongest and cheapest that could be made with a given amount of metal. The various ribs, fillets, flanges and curves that make up these latest patterns all have their particular functions to perform. Lateral as well as vertical stiffness and resiliency has been considered, as well as the rolling of the bar, the spiking facilities and the many other features which a practical and efficient splice bar must meet.

Fig. 10 shows a section of an extra heavy joint designed for a railroad that wanted to prove the greatest practical possibilities of the girder joint without regard for weight or cost. Its moment of inertia relative to that of the rail is 150 per cent. Fig. 11 shows the other extreme, a very light girder joint intended to meet price conditions where no more metal could be used than it takes to make the ordinary angle-bar. Its moment of inertia as compared with that of the rail is 71 per cent.

Fig. 12 shows a side elevation of a four-hole, girder-type joint of a late design and as now in service. Other late improvements, not shown in Fig. 12, have been in service on some large eastern roads for more than a year, the section of bar used being similar to that shown in Fig. 9, and the relative stiffness being about 104 per cent.

Fig. 13 shows a late form of angle-bar, embodying the thin slanting web and the T-rail section idea, but without the

girder member. The buckling tendency of the ordinary angle-bar is eliminated, and therefore its moment of inertia may be taken as proportional to its stiffness. A pair of bars of this design has a stiffness, calculated in this way, equal to 37 per cent. of that of the rail. This stiffness could be increased to 42 per cent. within practical limits.

From the foregoing outline history of the development of the angle-bar, and from the description and figures illustrating the latest designs, it may be readily conceived how intricate and how troublesome this development has been. During the last two years the angle-bar has gone through the process of refinement. More study has been devoted to it and more results accomplished during this short time than has been attained in any previous period of ten years. This is largely due to the tremendously increasing loads and traffic conditions, as well as to the increasing necessity for railroads to figure more closely in economizing on maintenance. The result is that splice bars are being rolled to-day which are the lightest and the cheapest that have ever been produced to successfully meet the heaviest conditions. Economical modi-

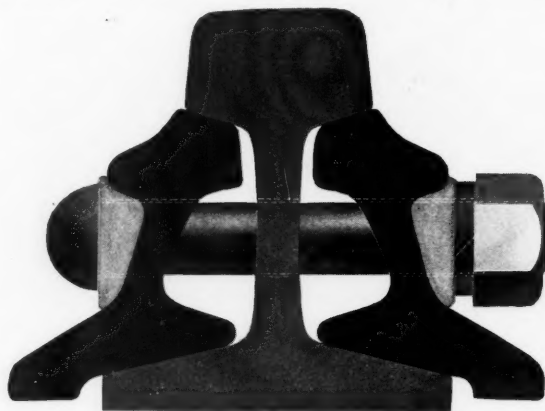


Fig. 13.

fications are also available so that a bar can be produced that will be in keeping with the pocketbooks of such railroads as can not afford the best. This all means better riding track and large reductions in cost of maintenance.

#### EXTENSION OF "A. B. C." RULES ON NORTHERN PACIFIC.

As stated by the *Railroad Age Gazette* in its issue of October 9, page 1109, the Northern Pacific has extended the A B C system of train operation from Trout Creek, Mont., to Auburn, Wash., a distance of 531 miles. The change on this part of the line was made on October 9. The results were so satisfactory that it has now been decided to extend the operation of this system also from Trout Creek easterly to Billings, Mont., a distance of 438 miles. When this change is made the total mileage operated under A B C rules will be 1,019 miles.

The change on the lines west of Trout Creek was made under the supervision of B. E. Palmer, General Superintendent of the lines west of Trout Creek, and the installation from Trout Creek to Billings will be made under the supervision of G. A. Goodell, General Superintendent of the lines from Mandan to Trout Creek.

The bulletin giving instructions for the change in operation was accompanied by blueprints prepared for the use of train dispatchers, indicating the nature of the various station layouts, the location of the switches and showing whether or not the approach to the station is on a curve or a tangent. This blueprint is placed in a long narrow frame and stands directly in front of the dispatcher as he works at his table.

The bulletin issued to trainmasters, dispatchers, operators, conductors and engineers on the Idaho division, of which A.



Beamer, originator of the A B C rules, is Superintendent, is as follows:

Effective at 12.01 a.m., October 10, and until further advised, trains Nos. 1, 2, 3, 4, 5, 6, 15, 16, 17, 18, 53, 54, 91, 92, 57 and 58, being all of the time card trains shown on Idaho Division Time-table No. 29, are annulled between Trout Creek and Spokane. All trains, including passenger trains, will be handled between Trout Creek and Spokane under A. B. C. despatching and block rules, which provide that all the running rights that a train has at any time are conferred upon it through the medium of a block card (sample attached). These block cards will be issued by the train despatcher, as a rule, one block in advance of the train.

A block is understood to mean the section of main line extending from the signal semaphore at one telegraph office to the signal semaphore at the next telegraph office in advance.

Blocks may be shortened by the establishment of new telegraph offices, or extended by closing established telegraph offices, either by discontinuing them altogether or by discontinuing telegraph service at such offices for certain hours as the necessity of the service demands. Whenever a change is made in telegraph service whereby a block is either shortened or extended the fact of such change being made will be bulletined for information of all concerned. In the absence of such bulletin or telegraphic instructions over the signature of the Superintendent the following list of blocks will govern:

Block No.	Between	Telegraph service.	Block No.	Between	Telegraph service.
1.	Trout Creek ... and Tuscor .....	24 hrs.	9.	Sand Point .... and Cocolalla .....	24 hrs.
2.	Noxon .....	24 "	10.	Granite ... 3 a.m. to 9 p.m.	
3.	Heron .....	24 "	11.	Athol .....	24 hrs.
4.	Cabinet .....	24 "	12.	Ramsey .....	24 "
5.	Clarks Fork ... and	24 "	13.	Rathdrum .....	24 "
6.	Hope .....	24 "	14.	Mauser .....	24 "
7.	Oden ... 7 a.m. to 6 p.m.		15.	Trent ... 5 a.m. to 11 p.m.	
8.	Sand Point .... and	24 hrs.	16.	Yardley .....	24 hrs.
			17.	Spokane .....	24 "

Train and enginemen are prohibited from accepting or running on a card purporting to authorize them to pass an open telegraph office.

No train will, except under flag protection, be allowed to leave a terminal or pass a telegraph office in the above described territory without both the conductor and engineer first securing a block card authorizing the train to use the block in advance, *no matter what may be the position of the signal semaphore.*

Immediately following the departure of a train from a telegraph office the operator will report its departure to the despatcher and to the operator at the next telegraph office in advance of the train.

Immediately upon receipt of this report the operator at the office in advance will assure himself whether the block in advance from his office is clear, and if so, he will at once ask the despatcher, in the form provided, for the block in advance for the approaching train. If his record shows the block in advance is occupied by another train, he will hold his signal against the approaching train at the horizontal or stop position until advised that the block in advance is clear.

Having secured the block card from the despatcher he will at once secure from the operator at the next office in advance a pledge of the block for the train for which the despatcher has authorized the block card. After this has been accomplished he will place his signal on the lower angle or clear position and deliver a copy of the card to the engineer and another to the conductor as the train passes his office.

Trains approaching telegraph offices and finding signal at clear will understand from this that the block ahead is clear

and will pass the telegraph office without reducing speed, catching the block cards as they pass. If, however, from any cause the cards should not be secured the train will be brought to an immediate stop and will not proceed until the cards are secured.

Despatchers will under no circumstances issue for a train a block card which bears any exceptions requiring them to perform any service *at the office where the train receives the card*, unless advised by the operator that the train has *stopped*, and that he can make delivery of such card before the train passes his office.

Conductors and engineers will immediately examine the block card following its receipt by them and make sure that it is correctly made out. They will follow implicitly all instructions given them thereon. If directed to take siding at a station they will do so *disregarding a signal to come down the main line*, the idea being that the rights conferred on the train by a block card cannot be *extended* by a signal, but may be *restricted* by one.

Station semaphore signal when on the horizontal or showing red indicates "Stop on main line before passing signal semaphore."

When on the lower angle or showing green, indicates "Block ahead clear."

The upward angle showing yellow will not be used.

When the view of station signal is obscure, distant signals are provided, whose indications are the same as those described above.

When taking siding to meet an opposing train or to be passed by a following train, trains will head in at the first switch at all points where lap sidings are provided. This reverses our present operation requiring trains to head in at the lap.

All exceptions, and the name of the telegraph office in advance, must be repeated to the despatcher by the receiving operator.

When necessary to change instructions on cards that have already been put out by the despatcher, he will invariably do so by annulling the card containing the instructions which it is desired to change. This will be done by issuing a card under a regular number, addressed to the conductor and engineer concerned, authorizing the movement required, and under the head of exceptions on that card the despatcher will state that card No. —, authorizing a certain movement is hereby annulled; care being taken to show the movement and the exceptions on the card it is desired to annul, as well as its number, so that the particular card it is designed to annul may be fully identified.

Despatchers will, when making a change in meeting or passing points, invariably use the term, "Instead of."

Operators will prepare three (3) copies of each block card when sent by the despatcher, one copy to be filed in the office, one to be delivered to the engineer, and the other to be delivered to the conductor.

When necessary for the purpose of doing switching or other work, to occupy the main line at a station, the despatcher will give the train desiring to do such work a block switching card on the usual form, limiting the time that the main line can be occupied without flag protection. On no account must the main line be occupied beyond the time limit expressed in such card.

Despatchers may, when necessary, authorize a train to occupy a block in which he has previously authorized a switching card. When this is done such a card will bear the notation, "Except main line at — occupied by train switching." In all such cases train running under such a card will approach station concerned under full control, expecting to find the main line occupied.

Work trains will be given block cards authorizing them to occupy track between telegraph offices for a certain specified time, to be shown on the card. At the expiration of this time

the work train must be in to clear at one end or the other of the block concerned.

All trains will be designated by the number of the engine pulling them.

In the event of a wire failure occurring between two telegraph offices, trains will simply flag across. When trouble of that kind occurs despatchers on the side of the break opposite from the despatcher in whose territory the break occurs will be advised of the fact by the operator closest to the break, and it will be understood to be the duty of the despatcher so notified to pick up the work of moving trains over the detached territory until repairs to the wire have been made, and the detached territory can again be handled by the despatching office in whose jurisdiction the trouble occurred.

As an example: Say the wires go down between Kline and Cheney in despatching territory handled from Pasco. The

#### THE MANHATTAN TERMINAL OF THE CENTRAL RAILROAD OF NEW JERSEY.

With the completion of the passenger section of its new terminal at the foot of Liberty street, New York city, the Central Railroad of New Jersey and its tenant lines, the Philadelphia & Reading and the Baltimore & Ohio, constituting the Royal Blue Line, will find themselves in possession of one of the most satisfactory railroad terminals along the North river. It is expected that the new station will be so far advanced by January 1, 1909, as to admit of its ground floor waiting rooms and slips being thrown open to the use of the public, though the upper floor and its connection by overhead bridge across West street will not be entirely completed until some months later.

Though the present article concerns itself chiefly with the



New Liberty Street Terminal of the Jersey Central, in Relation to the Old Terminal.

operator at Cheney would notify the Idaho division despatcher at Spokane, who would proceed to handle trains between Cheney and Spokane until such time as the wires were repaired.

#### FORMOSAN RAILROAD.

The Trunk Railway of Formosa was formally opened October 25 in the presence of General Prince Kanin of the Japanese army, and a large number of guests. The length of the railroad line is 334 miles. Since the building of the road began the industries of the island have been greatly developed. Sixty-two miles of the completed line was taken over by the Japanese from the Chinese in 1895. Japan built the 272 miles additional at nearly \$2,000,000 less than the estimate. A concession to build 450 miles of branch lines has been granted to the Formosan Sugar Refining Co., and branches aggregating 90 miles are already completed.

passenger station, it is necessary to state that this forms only a part of a complete terminal. As one of the steps toward the widening of West street and in connection with the removal of the bulkhead line some 180 ft. into the river, work on the demolition of the old Pier 14, adjoining the passenger station on the south, was begun in September, 1904. New piers, renumbered 10 and 11, have been built in replacement, with the exception that about 60 ft. of the space eventually to be occupied by the freight building and immediately adjacent to the passenger station, has been left as yet unoccupied for the requirements of traffic during the building of the passenger station.

As will appear from the accompanying engravings, the front of the new terminal buildings is removed some distance toward the river from the position occupied by the old structure. This distance is 130 ft., and consequently that width will be added to West street, while the removal of the bulkhead line affords an opportunity for the erection of piers 50

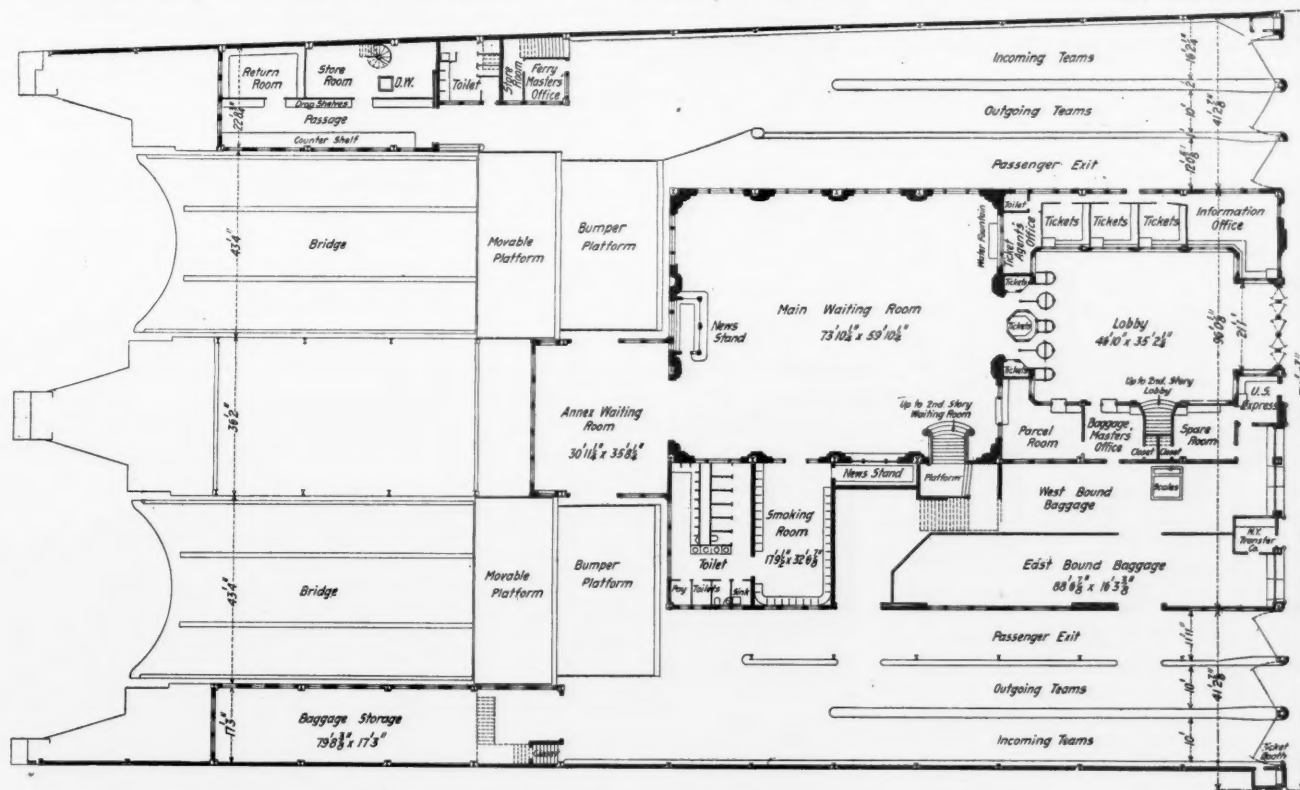


ft. longer than those previously existing, notwithstanding the amount cut off from the front. West street will therefore be 200 ft. wide, and, as in the case of the Pennsylvania terminal at the foot of Cortlandt street, an entrance for passengers will be afforded by the erection of an overhead bridge spanning this space. The concrete piers to serve as foundations for this bridge are already in place.

Work on dredging for the new bulkhead walls and the foun-

head wall was completed in November, 1906, and the foundation of the ferryhouse was finished in June of the present year.

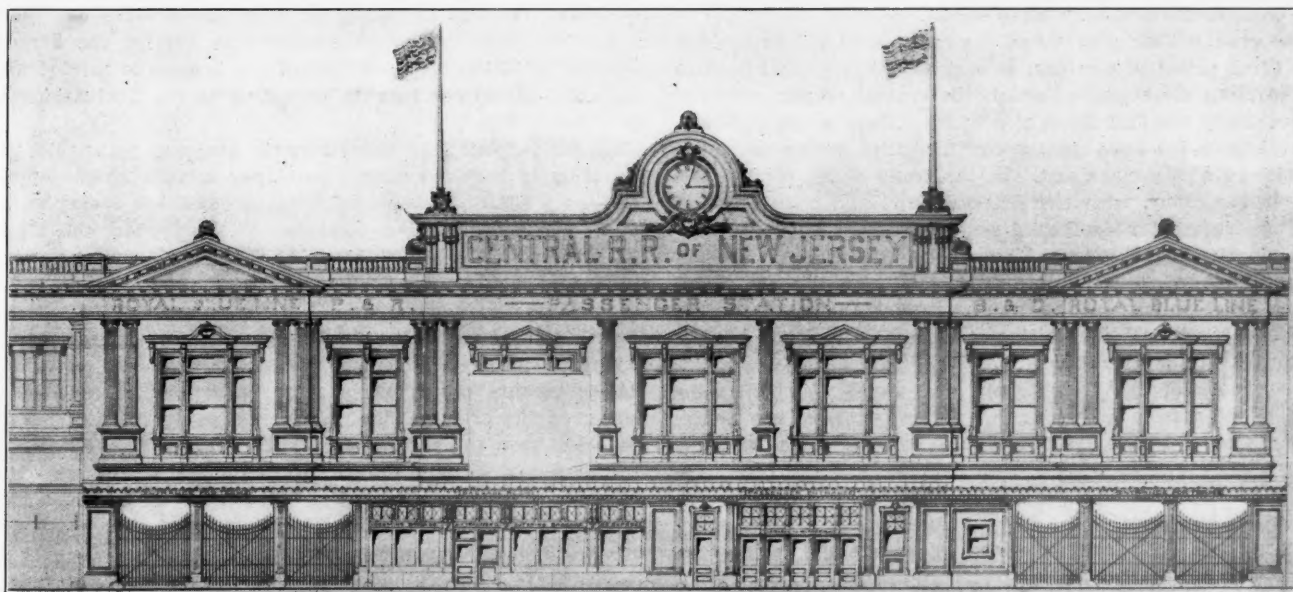
As shown by the engraving of the elevation, the passenger station is a handsome two-story structure, of which the second floor will form the principal part. It is understood, also, that the roof will be utilized on behalf of the city for recreation pier purposes. The front will be finished in copper worked



Plan of Ground Floor; Jersey Central Liberty Street Terminal.

foundations for the new station and slips was begun in May, 1905. In building this foundation, approximately 2,000 piles, varying in length from 35 to 75 ft., were used. These were cut off 16 ft. below low water mark, the space between the piles was filled in with crushed stone, and upon this foundation the concrete abutment was built. This work was extremely difficult and the employment of divers was necessary. The bulk-

into designs of the Ionic type, and the entire structure is designed to be as nearly fireproof as possible, the structural materials being a steel framework filled in with hollow brick. Concrete has been used freely in the walls and floors of the lower portion of the structure, and the only wood to be used is in the window trim. For this purpose quartered oak will be used. The walls of the waiting rooms on both the ground



Facade of Liberty Street Terminal; Jersey Central; New York City.

floor and the second floor will have a deep wainscoting of marble.

The progress of the work upon the steel structure is shown by the accompanying engravings from recent photographs. These also show what is left of the front of the old structure, which will be demolished as soon as the new is in condition for occupancy.

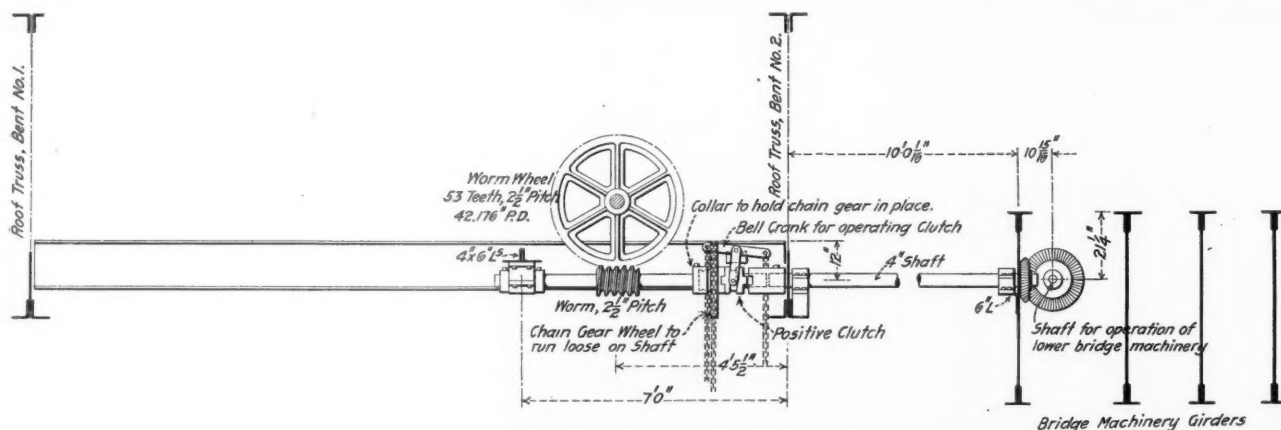
The steel work presents the appearance of lightness and grace. The river front of the structure is composed of two arches of semi-elliptical form, having a span of 69 ft. 6 in. and a rise of 16 ft. from the springing line. The arches are made up of two pairs of angles  $4 \times 3 \times \frac{3}{8}$  in., latticed with  $2\frac{1}{2} \times \frac{1}{4}$  in. lacing to form a single member 15 in. deep. The columns are made up of four  $6 \times 3\frac{1}{2}$ -in. angles and a 12-in. web. The adjacent columns between the two arches are latticed with double-angles attached to the columns by the use of  $\frac{1}{2}$ -in. gussets. Rivets are  $\frac{7}{8}$ -in. The outer columns are made up of similar angles for vertical stiffening members, united by web plates into a single girder 5 ft. 7 in. wide. The roof truss is made up of angles in the form of a lattice truss and in panels varying from 3 ft. 9 in. to 5 ft. 6 in. Upon the roof trusses of the several vents are carried the longitudinal members of the roof structure, consisting of 10-in. 15-lb. I-beams.

The steel work of the other bents is of a corresponding character, though the form of the bent is changed as required

about 24 ft. wide. From each end and along the north and south walls are the passenger exits, 12 ft. 6 in. wide. All these passages will have granolithic floors. The intermediate space is occupied by a lobby,  $29 \times 43$  ft., with ticket offices adjacent; waiting rooms,  $43 \times 98$  ft. and  $60 \times 74$  ft.; annex, 19 ft. 6 in.  $\times$  23 ft. 8 in., and women's waiting room, 23 ft. 8 in.  $\times$  40 ft., with toilet,  $22 \times 24$  ft. All floors are marble mosaic, except offices and women's waiting room, where oak floors are provided. Light shafts are provided on each side between the passenger exits and the waiting rooms and near the middle of the front for the accommodation of the offices upon each side.

The rooms in the wings alongside the bridges will be occupied by the Union News Company and for other purposes not yet determined. In the rear of the waiting rooms is a platform extending the width of the building and leading to the bridges, giving access to the upper decks of boats.

The feature of greatest novelty and perhaps, therefore, of the greatest interest, beyond the general fact of the construction of a commodious terminal, is the machinery for the operation of the bridges. This will appear from an examination of the accompanying engravings. The operating machinery is carried upon a group of four 60-in. plate girders carried by the roof trusses. These are approximately 60 ft. long, one group for each slip. At one end is a platform, upon which will be mounted the motor by means of which the bridges



Detail of Bridge Operating Mechanism, Showing Positive Clutch; New York Terminal of the Jersey Central.

by the introduction of offices along the sides of the building, suspended passenger bridges and the requirements of a central passageway for teams in the place of the central column between the two arches forming bent 1.

The ground floor plan shows that the space will be divided into three principal sections, as suggested by the architecture of the front elevation, of which the central section occupies substantially one-half the whole width. Each of the side sections has well-defined spaces for incoming trains, outgoing teams and a passenger exit. In the front of the central section is the lobby, with ticket offices, etc., and with separate baggage rooms for eastbound and westbound baggage adjacent on the south. Beyond the lobby is the main waiting room, 74 ft.  $\times$  60 ft., from which lead smoking and toilet rooms. An annex waiting room occupies the space in the middle beyond the main waiting room and between the bumper platforms of the two slips.

The floors of the lobby, main and annex waiting rooms will be of marble mosaic. The ticket, express and parcel rooms, etc., will have oak floors. The baggage rooms and passenger exits will be floored with asphalt, and the team passages and bumper platforms with wood block pavement. In the wings alongside of the ferry bridges space is afforded for ferry-master's office, baggage and other storage, employees' toilet, etc.

On the second floor the front of the building is occupied by a passageway extending the whole width of the building and

will be worked, power being transmitted by a shaft running longitudinally of the girders, with worm at four points intermeshing with worm gears upon the shaft carrying the sheaves by which the chains connected with the bridges are operated. The same group of girders also carries the several sheaves by which the dead load of the bridges is carried and supported at various heights, according to the fluctuations of the tide.

As will appear, the machinery is designed to enable the operation of both the upper and lower bridges at one operation, or to admit of disconnection or independent operation, by hand or otherwise. For clearness of illustration, the elevations showing the construction of the machinery supporting the bridge under dead load and that for operating it under live load have been separated in the accompanying engravings. As indicated in the elevation showing dead load machinery, each bridge is normally counterbalanced by a pair of counterweights connected by wire cable, one to each outer corner of the bridge. The cables pass over separate sheaves mounted upon the supporting girders and the counterweights are housed in suitable towers forming a part of the steel construction of the building. The construction of the dead load machinery provides for a range of 6 ft. movement above and below the median position shown.

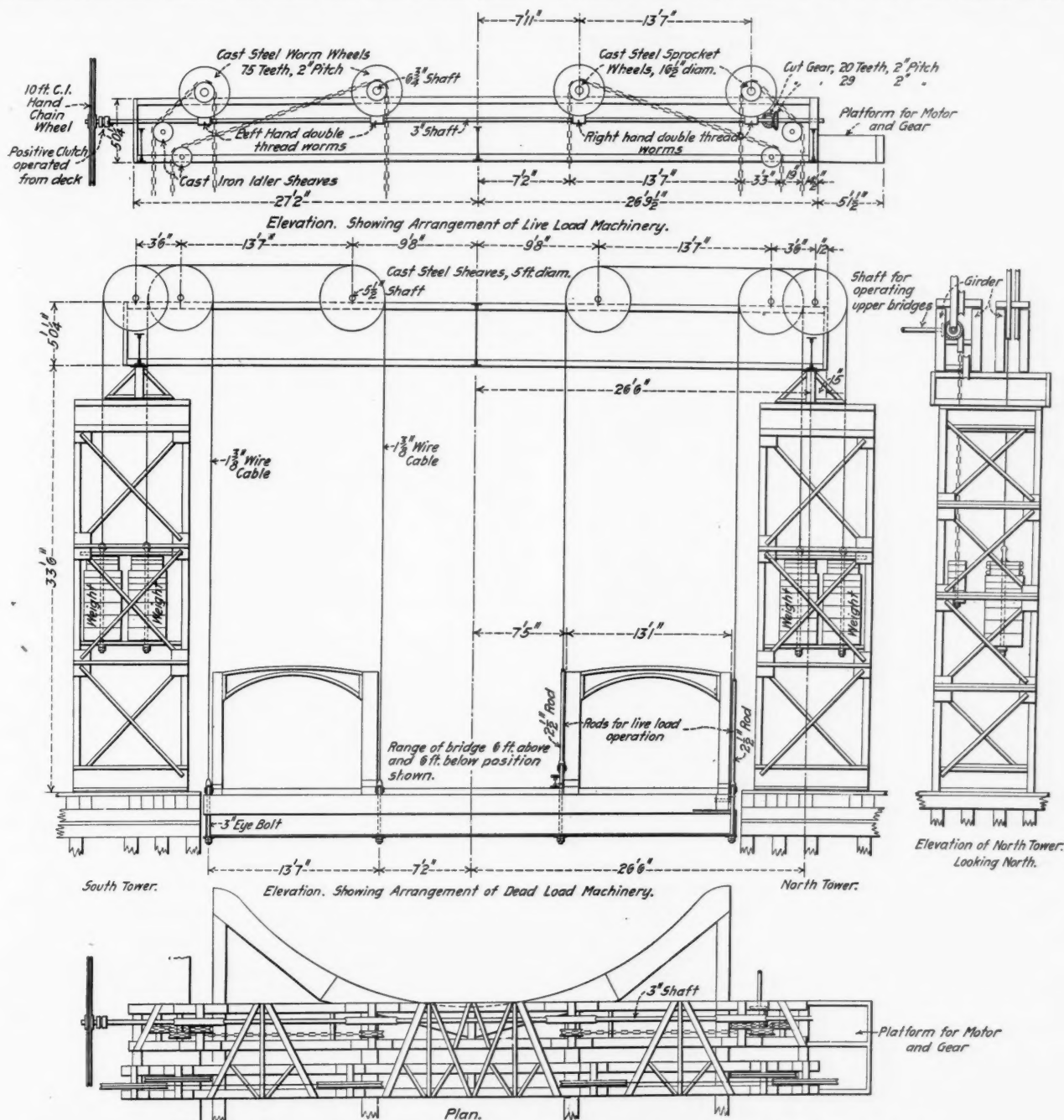
The gears forming a part of the live load machinery are each 48 in. in diameter, with 75 teeth of 2-in. pitch, mounted upon a shaft  $6\frac{1}{4}$  in. in diameter. The sheave carried by the



same shaft and over which the carrying chain runs is a sprocket 16½ in. in diameter. The pair of carrying shafts for each side of the bridge is spaced 13 ft. 7 in. apart, and the intermediate space is 15 ft. 10 in. The chains are 1½ in.

The longitudinal operating shaft is 3 in. in diameter, and the worms carried by it are right and left hand double-thread screws for the two pairs of worm wheels, respectively. The chains are connected with the bridges by a 2½-in. rod, between which and the chain is interposed a rubber spring, confined between U-bolts and plates. The other end of the chain passes

This shaft is operated from the lower bridge shaft by a bevel-gear connection near the motor end of the lower bridge shaft and the connection between the countershaft and the upper bridge operating shaft is by worm and worm-wheel. On this countershaft is a clutch, which may be operated from below by a chain and bell-crank to throw the clutch into or out of connection, whereby the two operating shafts may be operated in unison, or that of the upper bridges be thrown out altogether. The ratio of the bevel-gears forming the connection of the two shafts is 29 to 20, thus giving a greater



**Machinery for Operating Ferry Bridges; New York Terminal of the Jersey Central.**

from the sprocket over a cast-iron idler and to a counterweight contained within the same housing as the dead load counterweights.

At the opposite extremity of the main operating shaft from that at which the motor is connected, a 10-ft. cast-iron hand chain-wheel is provided for use in case of failure of the motor.

The shaft for operating the upper bridges is mounted in bearings upon a series of I-beams carried by the roof trusses of bents 1 and 2, parallel to the shaft from which the lower bridge is operated and at a distance of 11 ft. 4 in. therefrom.

rapidity and range of movement to the upper bridges. A loose wheel with endless chain, which is thrown into connection with the upper bridge operating shaft when the clutch is thrown to disconnect with the main operating shaft for the lower bridge, furnishes a means of operation by hand.

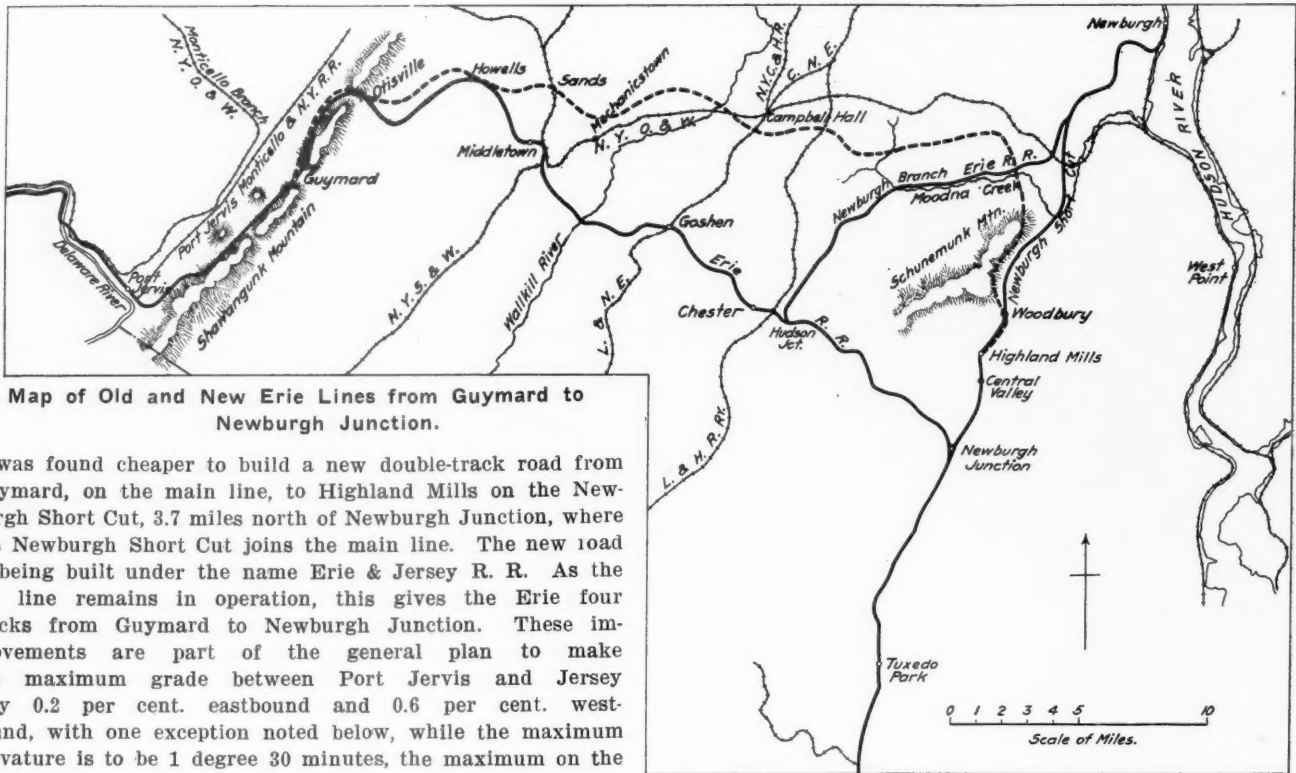
The construction of the terminal has been carried on under the direction and in accordance with the plans of the engineering department of the Central Railroad of New Jersey, Joseph O. Osgood, chief engineer, and George F. Morse, assistant engineer, in charge of the work. The construction has been

extremely difficult owing to the great volume and variety of traffic to be handled with as little interference as possible.

#### THE GUYMARD CUT-OFF.

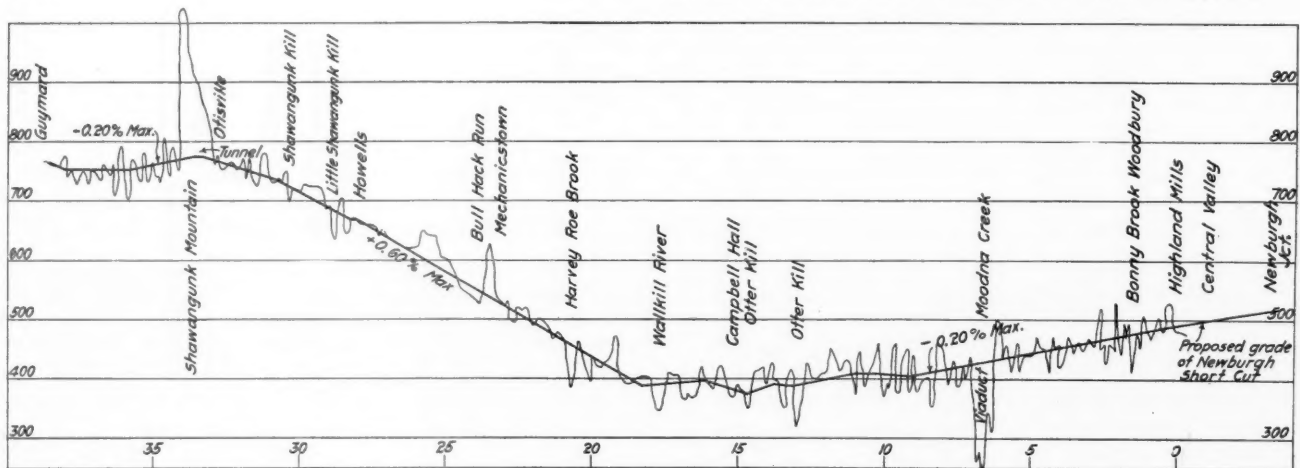
The existing main line of the Erie from Guymard, N. Y., to Newburgh Junction has a number of grades over 1 per cent., the maximum being 1.25 per cent., both east and westbound. It became necessary to increase the capacity of this line by adding tracks and lowering these grades. Instead of making a four-track line out of the present double-track road,

The Guymard cut-off is 42 miles long from Guymard to Newburgh Junction, while the present line between these points is 35 miles. Between these points on the present line, pusher service is necessary at three places, 10 engines being in constant service in this work. On the cut-off there will be no helper grade, but just east of Port Jervis there is a heavy grade where pusher engines will remain in service. It is impracticable to reduce this grade as the line must rise 344 feet in the eight miles between Port Jervis and Guymard, and the existing road makes this ascent as uniformly as possible. It is expected that when the cut-off is



it was found cheaper to build a new double-track road from Guymard, on the main line, to Highland Mills on the Newburgh Short Cut, 3.7 miles north of Newburgh Junction, where the Newburgh Short Cut joins the main line. The new road is being built under the name Erie & Jersey R. R. As the old line remains in operation, this gives the Erie four tracks from Guymard to Newburgh Junction. These improvements are part of the general plan to make the maximum grade between Port Jervis and Jersey City 0.2 per cent. eastbound and 0.6 per cent. westbound, with one exception noted below, while the maximum curvature is to be 1 degree 30 minutes, the maximum on the old line being 7 degrees. The accompanying profile shows the grade from Guymard to Highland Mills and also the grade from the latter point to Newburgh Junction. This is indicated as being proposed, but it has now been reduced as shown. It is expected to increase the train load eastbound 63 per cent. and westbound 83 per cent. Eventually the grade between Port Jervis and Chicago is to be reduced to 0.3 per cent. both east and westbound. In connection with the Guymard cut-off, grades on the present line, Newburgh Junction to the Hackensack river, are to be reduced and alinement corrected to correspond with grades and alinement on the Erie & Jersey R. R.

completed, 19 locomotives will be able to haul as many cars between Port Jervis and Jersey City as 32 can at present. The existing line from Guymard to Newburgh Junction will remain in service for all passenger traffic and for local freight traffic. The high grades do not interfere with passenger train operation and Middletown is an important passenger station, all except one of the through passenger trains making stops there. All through freight traffic will go over the new line. It is not expected that any local traffic of importance will be developed on this line, as the territory is already well served by several lines of the Erie and other companies.



Profile of Guymard Cut-Off.



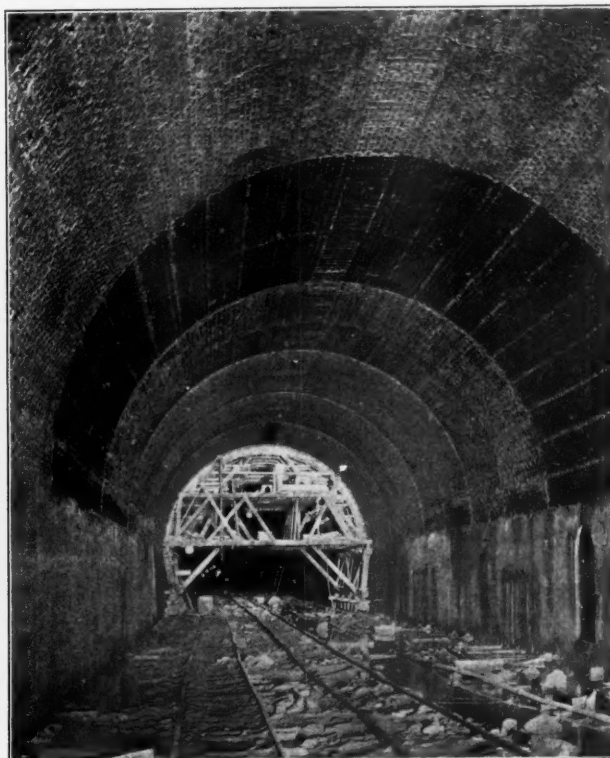
Work on the cut-off began in September, 1905, and it is expected that the road will be in operation by January 1, 1909. The section from Guymard to Howells, 10 miles, is already in service, the first train, 61 loaded coal cars, total weight 4,295 tons, being hauled over it by one engine on October 21. For about four months in the spring of 1907 work was suspended because the company could not get money on reasonable terms. Since June of that year, however, work has been actively under way.

It is of standard construction with rock ballast throughout. The fills are temporarily ballasted with gravel and the track is laid with 90-lb. rail. The estimated cut work is

Guymard is near Otisville, in a notch between two peaks of Shawangunk mountain. To get up to this notch, the old line continues along the western slope of the mountain at a maximum grade of 1.26 per cent., requiring pusher engines. On this section, from three to six pusher engines are constantly in service. The line after getting over the crest goes down hill, making the maximum westbound grade 1.09 per cent. The cut-off gets its low grade between Guymard and



Eastern Portal of Otisville Tunnel.



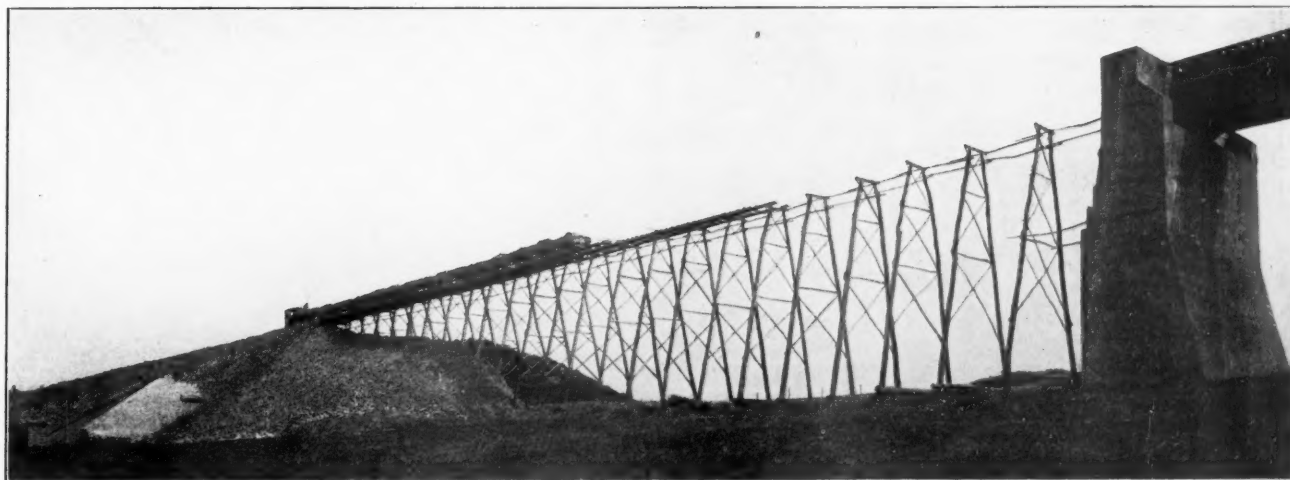
Otisville Tunnel.

4,500,000 cu. yds. of earth. There are about 76,000 cu. yds. of concrete work for culverts, abutments and piers for bridges. Nearly all of this is unreinforced. The heaviest cuts are the two near Mechanicstown, one of these being 95 ft. deep at its deepest point. From this one, 396,000 cu. yds. of earth and sand were taken out. The rock cut work was not heavy. Where most material was excavated it was of soft or loose stone which could be handled by steam shovels without blasting.

The most interesting construction was the line from Otisville to Howells. The highest point between Howells and

Howells by tunneling through the mountain at Otisville instead of climbing to the elevation of the notch. The alignment, as shown on the map, is not far from the old location.

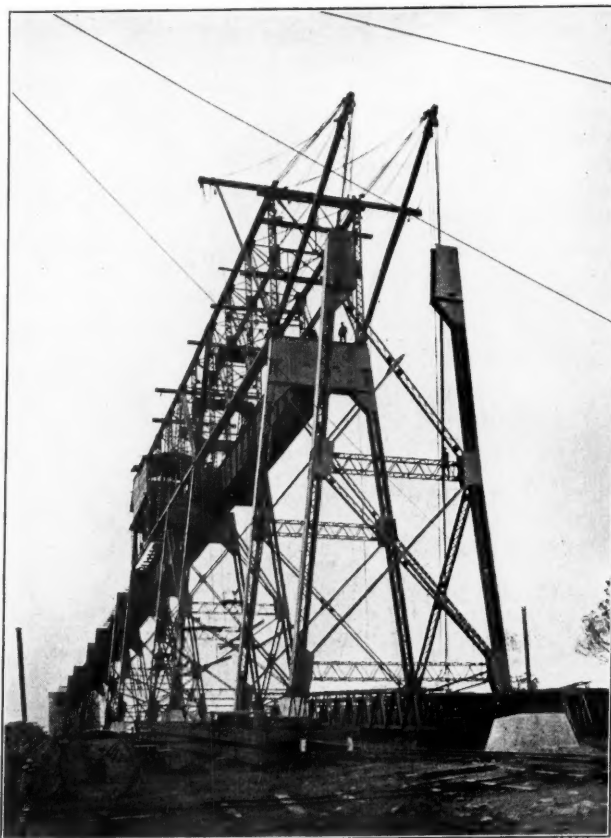
The first work on the Erie & Jersey began on the Otisville tunnel. Shafts were driven at the present eastern portal of the tunnel and at a point about midway between the eastern and western portals. Four headings for the tunnels were begun at the same time; one at the foot of the shaft at the present east portal, two from the foot of the shaft in the middle of the tunnel, and one at the western portal. At the same time, work was going on in the cut approach to the eastern portal.



Fill Approach to Wallkill River Viaduct; Guymard Cut-Off.

No cut was necessary at the western end. The chief difficulty was at the eastern end, where the sand was so loose and wet that it was very hard to keep it from filling in as fast as it was dug out. The accompanying photographs show the eastern portal and the interior and centering. The arch is a full half circle of 15-ft. radius and there are concrete side walls 10 ft. high from top of subgrade to springing line of arch. Near the west portal there is 800 ft. of tunnel through good sand stone (conglomerate), and here the tunnel will not be lined. Throughout the rest of its length, it is lined with concrete and brick. The shaft driven midway between the two portals of the tunnel will probably be closed in some way. The gradient of the approach to the western portal is 0.2 per cent., in tunnel, 0.15 and 0.1, and eastern approach, 0.3 per cent. While work was being pushed on the tunnel, five men, during one working month of 26 days, arched 654 ft. of tunnel with brick. A Haines concrete mixer with three large hoppers was used. This is shown in the foreground in one of the photographs. There are about 3,910 cu. yds. of concrete work in the tunnel.

There are three viaducts. One is a concrete structure having four 60-ft. arches and two 40-ft. arches. This is over the Wallkill river, about half way between Middletown and Goshen, and was built by contract. One of the accompanying photographs shows work under way on the fill approach to this structure. Another photograph shows the viaduct at Woodbury, erected by the company's forces. This carries the new line across the old tracks, which are shown in the photograph. This viaduct is 590 ft. long. The longest structure is the Moodna Creek viaduct, near Salisbury Mills, also erected by the company's forces. This is 3,200 ft. long and at one point is 196 ft. above the ground. It consists of alternate 40-ft. and 80-ft. deck girder spans carried on steel towers. It now carries but a single track. The accompanying photograph shows the two central girders supporting this track. It is eventually, within 10 years, to be double-tracked by adding girders on each side and strengthening the supporting towers. The short longitudinal girders are 5½ ft. deep and the long ones 9 ft. deep. At their ends, they are web connected to double traverse girders 10 ft. deep, which cap the towers. There are expansion joints in every other pair of 80 ft. girders. The photograph shows the trav-



Moodna Creek Viaduct.

eler used in erecting the bridge members. It was 200 ft. long, 30 ft. high, 19½ ft. wide on centers and weighed about 100 tons. It was of cantilever construction with enough overhang, including booms, to handle material 125 ft. from the last completed tower. A 15-ft. crane ran from the center of the traveler out to its outward end, the crane running on I-beams 18 ft. above the floor.

The Guymard cut-off is being built under the general charge



Crossing of Old Line by New Viaduct at Woodbury; Guymard Cut-Off.



of F. L. Stuart, Chief Engineer. We are indebted for information and illustrations to G. H. Burgess, Principal Assistant Engineer; C. K. Conard, Assistant Engineer in charge of the work, and to A. G. Norton, Resident Engineer at Otisville.

### ELECTRIFICATION OF MELBOURNE SUBURBAN LINES.\*

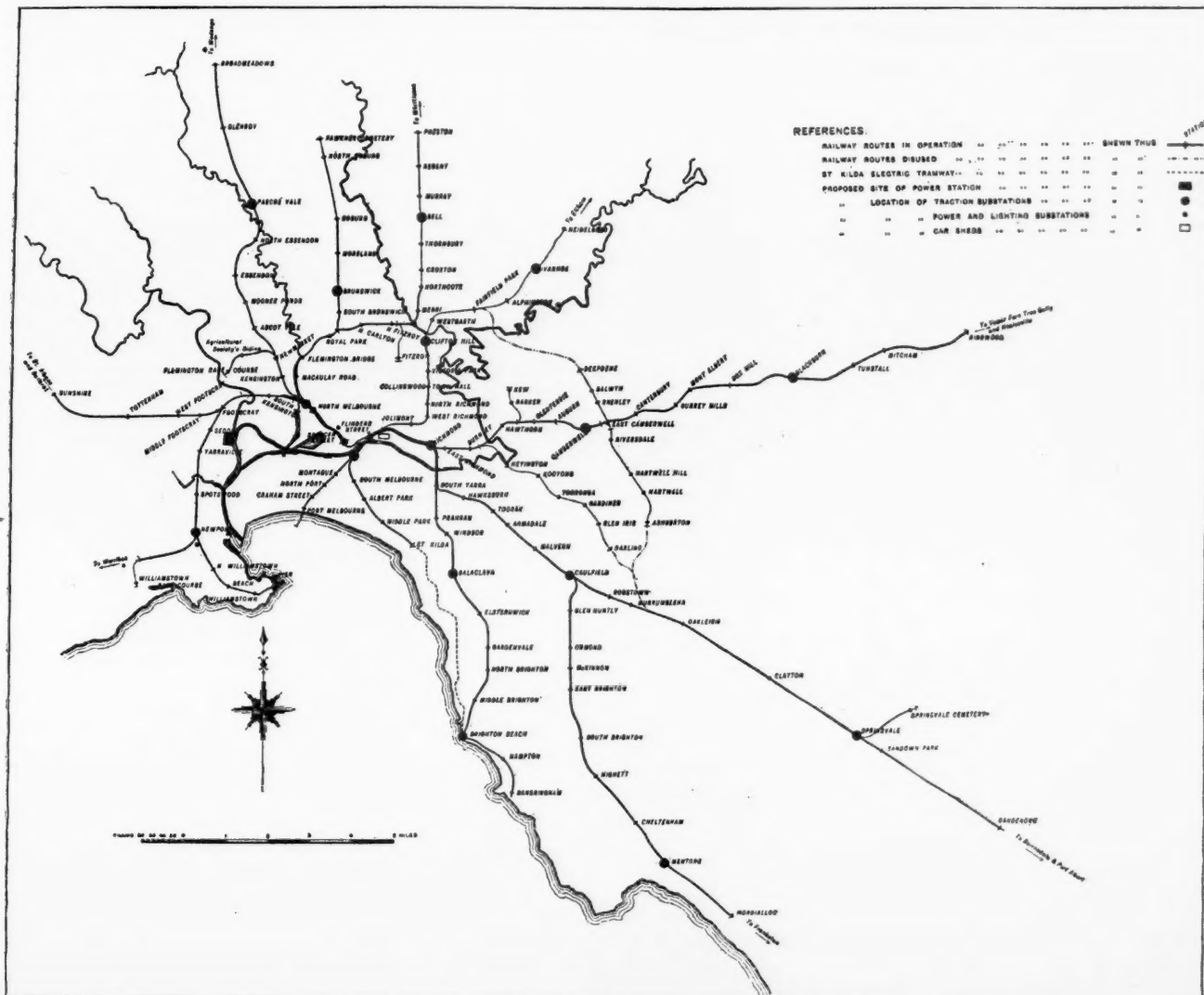
BY CHARLES H. MERZ, M.INST.C.E.

(In the following article the special conditions obtaining in Melbourne are dealt with and compared with those in other great cities and the effect of these conditions on the problem of electrification, and the advantages to be obtained from it.)

The Melbourne suburban system bears a relation to the railroad system as a whole very different from that obtaining in most leading cities of Europe and America. The relative im-

portance of the suburban passenger traffic is in general of less importance than the main line business, the Victorian railroad system may be considered as divided into two parts—the suburban and the remainder. The lay-out of the system bears witness to the great importance of the suburban business, special and distinct tracks for the radial lines having been laid right into the city to a greater extent than in any other place with which I am acquainted.

In short, whereas in Europe and America the suburban



Melbourne Suburban System; Victorian Railways.

portance of the suburban and country passenger traffic is shown by Table I:

TABLE I.—Victorian Railways—Analysis of Passenger Traffic.

Year ending	Mileage		Journeys	
June 30, 1906.	Track.	Train.	Passenger.	Receipts.
Suburban system.†	298	2,772,669	59,477,123	\$2,895,000
Remaining system ..	4,006	4,080,135	5,218,252	4,389,000
Total .....	4,304	6,852,804	64,695,375	\$7,284,000
Suburban percentage 6.92 pr ct.		40.5 pr ct.	92.0 per ct.	39.7 pr ct.

†The figures given for the suburban system in Table I. include the returns for race and special traffic, and also those for certain outlying sections, not comprised in Stage III.

While possibly the Melbourne system is not unique in this respect, it is doubtful if on any other large railroad system the

\*Abstract of the Report to the Victorian Railways Commissioners on the application of electric traction to the Melbourne Suburban Railway system. Published by courtesy of the Commissioners.

passenger business of the chief railroads is in general of less importance than the main line business, the Victorian railroad system may be considered as divided into two parts—the suburban and the remainder. The lay-out of the system bears witness to the great importance of the suburban business, special and distinct tracks for the radial lines having been laid right into the city to a greater extent than in any other place with which I am acquainted.

The preponderance of suburban passenger traffic over the country traffic has continued for some years in Melbourne and, looking as far as possible into the future, it appears likely to continue. This seems to be due: First, to the large population of Melbourne (526,400) compared with that of the whole state, amounting to 42.5 per cent. as compared with London

20 per cent., Edinburgh 7.3 per cent., Paris 6.9 per cent. and Berlin 5 per cent. Second, to the fact that people live away from the center of the city and are scattered over a wider area than is general even in American cities, and certainly to a greater extent than is usual in England or even on the continent of Europe. This is apparent from the density of population which, in Melbourne, is 2,064 per square mile as against 9,510 in Greater London, 11,195 in New York, 19,060 in Edinburgh, and a still greater density in Paris and Berlin. In Sydney, Perth and Wellington, the populations are all denser than in Melbourne. Third, in large measure, to the fact that a large part of the business which, in a European or American city, would be dealt with by electric tramways or separate electric railway systems, is dealt with in Melbourne by the suburban railroads.\*

I make this last statement having fully in mind that the cable tramway system in Melbourne is really excellent. Nevertheless, the fact that the tramway system is a cable system is no doubt in favor of the suburban railroads securing a larger proportion of the longer distance suburban traffic than would be the case if the tramways were electrically operated. This arises not only from the higher speed possible with an electric tramway system in the outskirts, but also because a cable tramway system is necessarily restricted in regard to facility of extension and ability to deal commercially with light and infrequent traffic. A cable tramway is expensive to build and hence unremunerative to operate unless there is a demand for a more frequent service of cars than is the case on the outskirts of a large town. These drawbacks of a cable system, viz., the high first cost and the difficulty of extending it and of operating it economically with an infrequent service, prevent new lines, and especially long lines, being built so readily as with an electric system.

The growth of travel in Melbourne and suburbs, both tramway and railroad, is shown by Table II., which compares the suburban railroad and tramway traffic and gives also the travel per head of the population. Except for the depression during 1902-1904, the growth has been continuous and marked.

As the state owns the railroads, and as the business done by the suburban railroads is such an important one, it is of course proper, as well as of great benefit to the community, that the best possible service should be given consistent with considerations of economy. Apart altogether from any question of competition, this is a sufficient reason for a thorough investigation into what electric traction can do in the way of improving the present service, although this is already better than the steam service to be found in most capitals.

The routes of the Melbourne railroads and tramways are in many cases parallel, specially near the center of the city. It will be seen (Table II.) that the tramway receipts are nearly equal to the suburban railroad receipts and on the routes which are parallel there is, of course, considerable competition between the two systems, the traffic on any particular route, no doubt, going to that system which in that particular instance gives the greater facilities, having in view, of course, both frequency of service and distance to be traveled. Apart altogether, therefore, from the normal growth of traffic, there is the question of how far the adoption of electric traction in Melbourne, with an improved schedule speed and frequency of service, would result in the railroads securing a greater proportion of the total traffic than is possible with steam traction.

I have thought it well to call attention to these general considerations at the commencement of my report because they

\*In London the suburban systems that form part of main line railroads carry less than one-fourth of the total suburban passenger traffic, the remainder being handled by separate and exclusively suburban railroad systems and by tramways and omnibuses. In Sydney the suburban railroads carry only a fifth of the total suburban traffic and account for less than one-third of the total revenue from the suburban passenger business; in Paris and New York the ordinary railroads carry an even smaller proportion of the total suburban traffic of those cities; in Melbourne, out of the total traffic handled by the tramways and suburban railroads, the railroads now account for more than one-half.

have an important bearing on the electrification problem. The real problem is to decide whether it is commercially sound to adopt electric traction on any or all of the suburban railroads. This is necessarily largely dependent on the natural growth of the suburban business that will in any case have to be provided for; it also depends on the increase of traffic which will result from the adoption of electric traction and the additional facilities offered thereby.

There can be no question that, even when considering the operation of an entirely new system where an existing equipment has not to be replaced, electrical operation necessitates a higher capital expenditure than steam operation does. That is to say, more capital is involved in providing the electric power station, line and rolling stock equipment than in providing steam locomotives.

In return for this, and especially if the train service be fairly frequent, electrical operation should show, if properly carried out, a considerable saving of operating expenses, especially if these be considered per train-mile.\* In addition, electric traction compared with steam traction ensures, with a well-ballasted track such as that of the Melbourne suburban railroads, an almost complete abolition of dirt, smoke, noise and smell; such improvements are, perhaps, of even more benefit to people who have to travel every day than to long-distance travelers and will be secured even if the goods traffic continues to be operated by steam locomotives, for most of the drawbacks of steam traction arising in this way are caused by the locomotive on the train itself, and only to a much less degree by locomotives on other trains.

Besides these incidental advantages, electrical operation affords, where stops are frequent, the means of increasing the schedule speed—that is, of reducing the time for any particular journey to an extent commercially impossible with

TABLE II.—Growth of Suburban Travel in Melbourne.

Year ending June 30.	Passenger Journeys.	Journeys per head of population.	Receipts.	Receipts per head of population.
1898—Railroads ...	38,912,263	159	\$1,980,000	\$7.97
Tramways ...	36,245,280		1,800,000	
1899—Railroads ...	41,406,374	166	2,070,000	8.17
Tramways ...	38,875,210		1,890,000	
1900—Railroads ...	45,103,936	177	2,330,000	8.85
Tramways ...	41,661,580		2,020,000	
1901—Railroads ...	50,120,411	196	2,580,000	9.72
Tramways ...	47,195,647		2,260,000	
1902—Railroads ...	52,392,749	199	2,630,000	9.62
Tramways ...	47,261,572		2,210,000	
1903—Railroads ...	50,064,367	193	2,560,000	9.28
Tramways ...	46,832,910		2,110,000	
1904—Railroads ...	49,495,738	195	2,580,000	9.42
Tramways ...	49,183,742		2,160,000	
1905—Railroads ...	55,156,545	206	2,700,000	9.53
Tramways ...	50,297,357		2,180,000	
1906—Railroads ...	59,477,123	216	2,900,000	9.91
Tramways ...	52,925,654		2,280,000	
1907—Railroads ...	64,162,344	236	3,130,000	10.70
Tramways ...	60,558,098		2,520,000	

steam locomotives. This arises from the fact that, as the source of power is not carried on the train itself, a much greater amount of power can be applied to the train, especially for short times, and thus the acceleration can be increased beyond that possible with a steam locomotive. This same feature of greater acceleration also greatly facilitates the handling of a large number of trains over heavily-worked lines and in crowded terminals, and reduces to a minimum the possibility of delay due to stoppages by signals.

\*It is usual with electric traction to run many more train-miles than with steam traction, because the capital having once been spent extra train-miles involve very little additional expenditure. This results in a reduction of the average costs per train-mile, even if there be no reduction in the total cost of operation.

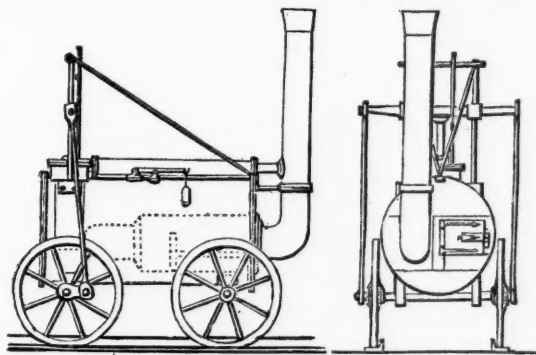


## THE CENTENARY OF RAILROAD TRAVEL.

BY W. B. PALEY.

Although the fact has apparently escaped public notice, it is just a century since what may be termed, with no very undue stretching of the phrase, the first steam passenger train, startled its beholders with its extraordinary capabilities. The precise date on which Richard Trevithick's experiments with a locomotive, drawing a common-road carriage upon flanged rails or plates began, is a matter of some uncertainty, but there is every reason to suppose it was on Monday, August 1, 1808. The locality was somewhere in the angle formed by the Tottenham Court Road and the New Road—now called the Euston Road, London, probably as nearly as possible at the north end of Torrington Square, a neighborhood well known to the many Americans who prefer boarding-houses to hotels on their visits to London. Here, on what was then a piece of waste ground, Trevithick erected a circular boarded enclosure, charging five shillings for admission to see the performance of his engine. Evidence is known to exist that people did pay this fee, which included a ride round in the open landau or carriage attached to the engine, if they could muster up courage enough. How far this goes towards realizing the idea of a passenger train everyone must determine for himself.

The trials seem to have proceeded from a bet between Trevithick and some person or persons unknown, as to the relative



Trevithick's Locomotive, 1803.

capacities for work of a locomotive engine and of a race-horse. The affair was to be decided at Newmarket races in October, 1808; the London experiments being made, probably, to ascertain what chance an engine might have. Whether the untimely end of these, the cost of laying a railway or plate-way for the engine at Newmarket, and of getting it there, or the difficulty of arranging fair terms, rendered the bet void is not known, but no trace can be found that anything was done at Newmarket in connection with the wager. A contemporary account says that it was for the sum of £10,000, that the engine was the favorite, the scheme being to see which could go farthest in 24 hours, starting at the same time. In those days the making of absurd bets upon every imaginable subject was very common, and Trevithick, having previously won a smaller bet over his locomotive performance in South Wales, was the more likely to enter into another.

The engine used was a different one, apparently simply the boiler of a pumping or dredging engine, mounted on four smooth wheels, with a single vertical cylinder sunk in it. From a cross-beam at the top end of the piston rod, long connecting rods worked the pair of wheels immediately below through pins in the latter. The sort of boiler Trevithick commonly used had a cast-iron shell, about an inch thick, say 5 ft. long, and 3 or 4 ft. in diameter. One end was slightly convex, the other open, with an outside flange round the edge. On this end was fitted a wrought-iron cover provided with a return-flue of the same material. Bars being laid in this to form a grate, and a funnel added to the other end outside the plate, the latter was bolted to the flange and made steam-tight.

Thus the heating arrangement could be taken out bodily, permitting the most perfect examination or cleaning of the barrel. One of these boilers is at the South Kensington Museum. They were heavy, of course, and not very trustworthy, though probably the numerous failures with them were largely due to ignorant management.

Trevithick gave notice in the papers that the "Racing Steam-engine" would commence its performances on Tuesday, July 19, 1808, at 11 a. m. Probably it did begin then, but next day its proprietor had to announce that they were put off till the 25th, "the ground under the Railway, on which it was to run, being too soft and spongy, requiring additional support of timber." However, he wrote to a friend on Thursday, July 28, that he had "taken up the whole of the timber and iron, and laid balks, of from 12 to 14 inches square, down on the ground." He had "nearly all the road laid again, which now appears very firm." The engine was pushed round by hand to test the new work. It seems plain that the original failure was due to absence of ballast. The term balk, or baulk, is applied usually to large lengths of squared timber and would seem to imply that he used longitudinal sleepers. Although making a circular track with such would require elaborate carpentry, it would at least support the cast-iron plates continuously. As there was no doubt of the usual size and weight, namely, 3 ft. long and 40 lbs. in weight, it is pretty clear they could not carry an 8-ton engine at 12 miles an hour with any system of isolated supports. Trevithick himself gives this as the weight of the engine, and with a cast-iron boiler it could hardly have been less.

No account appeared, that the present writer has been able to trace, of the actual results of the trials. No notice was given when they would finish, nor in fact when they would begin, other than the one quoted, but as the letter of July 28 says the writer "hopes it will all be complete by the end of this week" (July 30). Monday, August 1, was no doubt the actual date. Nearly 40 years later one who had ridden round the circular railway, timing the speed as 12 miles an hour, wrote that the engine "ran for some weeks, when a rail broke, and made the engine fly off at a tangent and upset, the ground being very soft at the time." As poor Trevithick had spent all his means on the enclosure, and costly re-laying, while very few people came to see the show, he gave it up and the engine was not put on the road again. One reason for the lack of patronage was, no doubt, the insufficient advertising, while the two postponements, which could apparently have been avoided with a little forethought, must have prejudiced people against coming to see it. Very similar engines were used by Trevithick for driving dredging machinery, and for many other purposes. At the period in question he was engaged in making a tunnel under the Thames between Stepney and Rotherhithe, almost on the site of the one opened in June last, in fact a temporary suspension of these works, (which were never completed) gave him the opportunity to try the memorable railway traction experiments which have just been described.

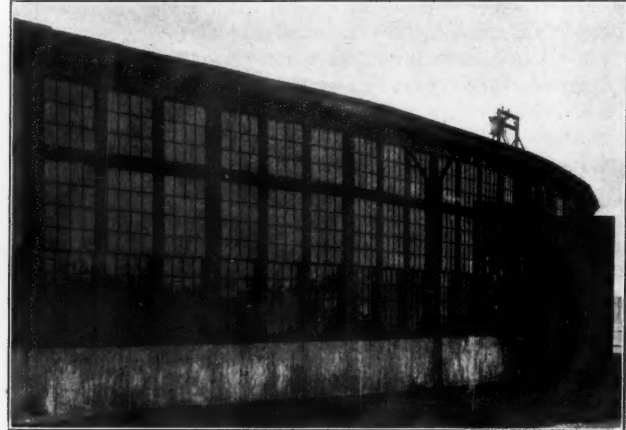
The demand for wire-netting for railroad fences is likely to be great in Germany in consequence of a recent court decision. At Bochum, where the track was enclosed by a live hedge and wire, a valuable hunting dog succeeded in creeping through and getting in the way of a train, which cut off one of her forepaws. The owner sued for damages, claiming \$240, which, as the bitch could go on breeding with but one forepaw, seems pretty steep. The trial court condemned the defendant (which was the Prussian Treasury) to pay it, however, and the court of appeal confirmed this judgment, saying: An accident is unavoidable only when the utmost care compatible with the economic returns of the business would not have prevented it. It was possible without ruining the railroad to keep up a dog-proof fence. The fence at Bochum was not dog-proof, for the dog got through.

**WABASH LOCOMOTIVE TERMINAL AT DECATUR, ILL.**

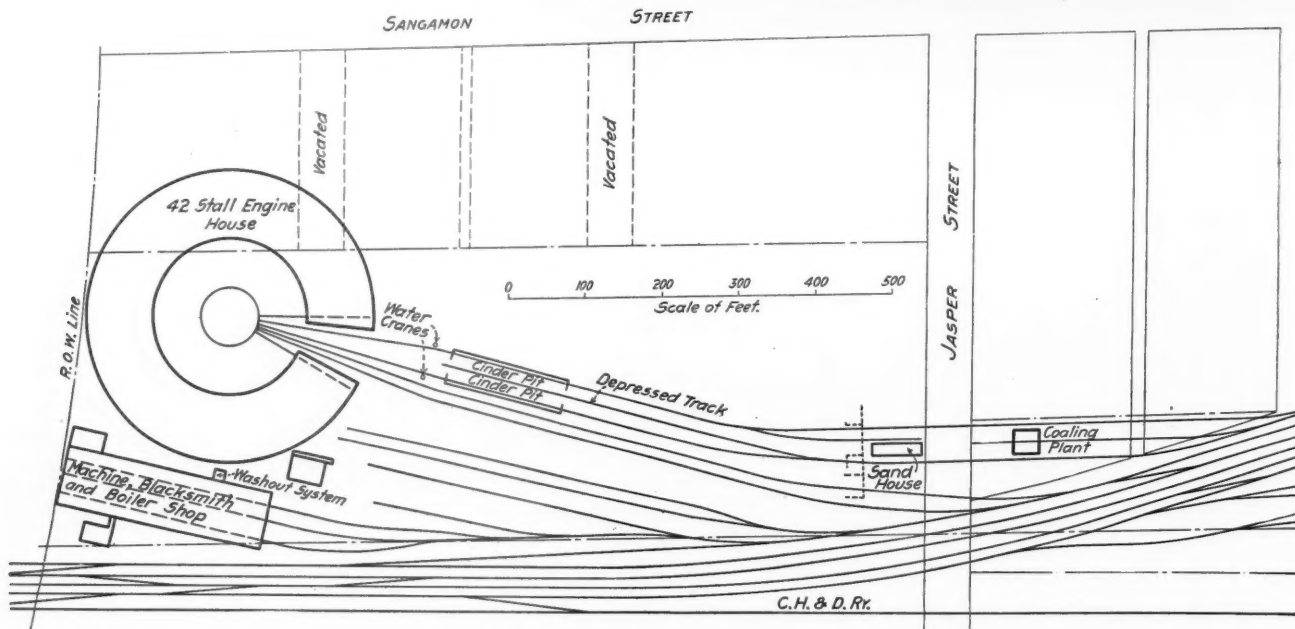
The Wabash Railroad placed in operation in February, 1908, a new locomotive terminal at Decatur, Ill., which includes a number of new features in the construction of engine houses, as well as interesting details in the methods of handling coal and ashes and in the plant for washing out and filling up boilers. The terminal was designed with the special object in view of handling the locomotives with the least delay, as it is well known that locomotives are often detained at roundhouses and yards approaching them a larger percentage of time than they are in service.

An unusual feature is shown in the general plan of the tracks, where it is seen that there are four tracks leading to the turntable. Two of these are for engines passing into the roundhouse and two for engines going out. The two entering tracks pass one on each side of the coaling plant, sand house and cinder pit, and the yard tracks are arranged so that when road engines are coming at the most busy time, the switching engines of the large freight terminal at Decatur, which require coal, water and other supplies four times a day, can be easily taken care of without interfering with the movement of the through engines. A large wooden building 275 ft. x 80 ft., located directly south of the new roundhouse, which was formerly used as a coach shop, has been converted into a machine,

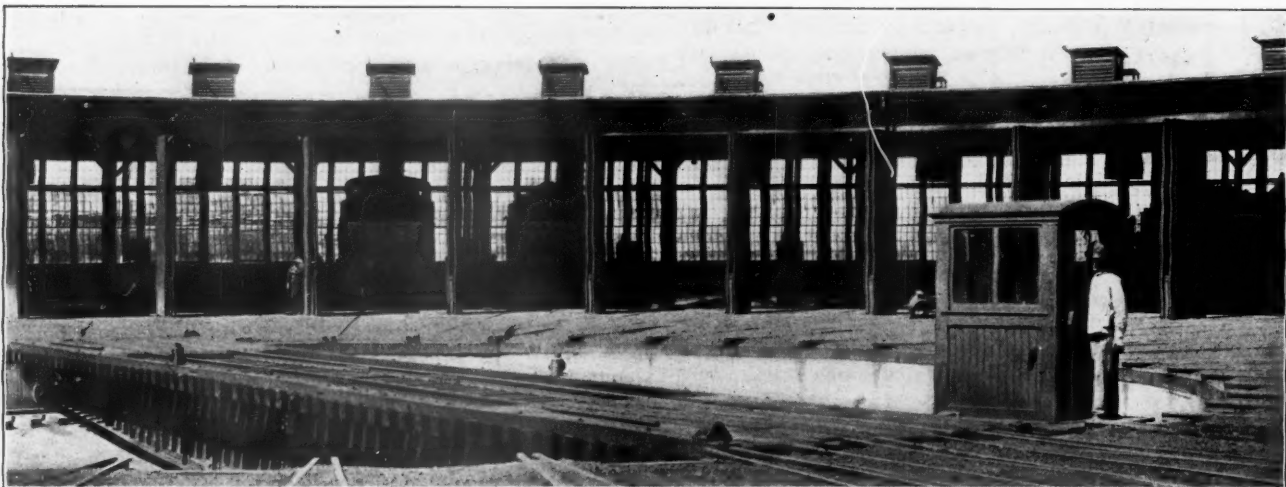
blacksmith and boiler shop, for the exclusive use of the terminal, and, as there is abundance of room, it is also used for locomotive stores and for the modern washing out system, which occupies considerable space. This shop has direct and convenient communication with the roundhouse through large door openings. The large roundhouse is almost a complete



Exterior, Showing Cement Base.



Location of 42-Stall Roundhouse..



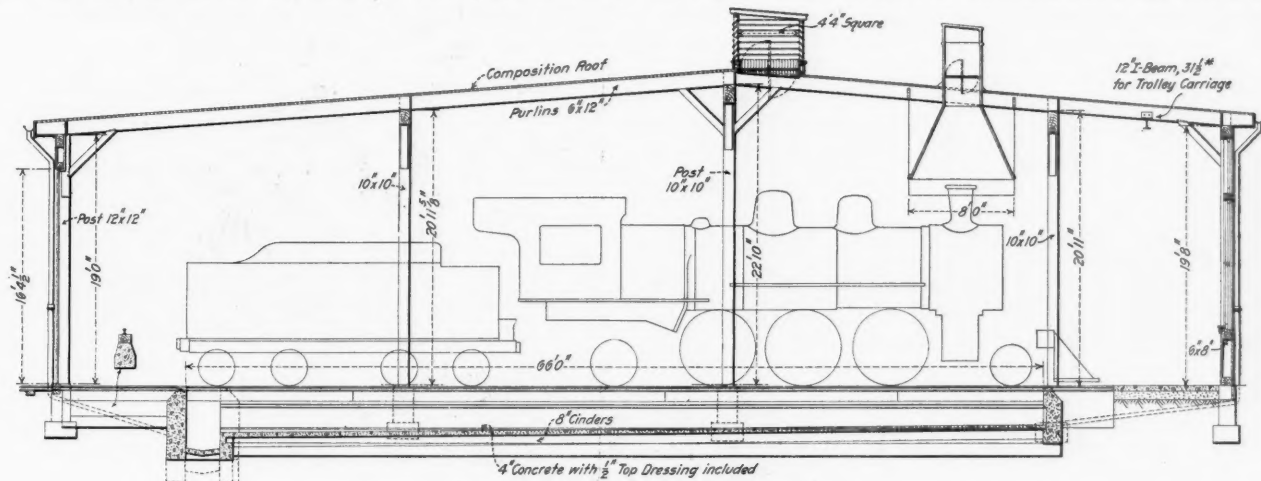
View of Inner Wall and Turntable; Wabash Roundhouse at Decatur, Ill.



circle and contains 42 stalls. The width of the house, out-to-out of posts, is 90 ft. 10 in. It is built almost entirely of wood, the posts in the inner circle being 12 in. x 12 in., and those in the outer circle 8 in. x 8 in. The outer wall is completely filled with glazed sash above the window sills and below the sills the wall is made up of an 8 in. x 8 in. base and a 6 in. x 8 in. sill directly under the sash; to these are fastened

The location of intermediate posts and the roof construction is plainly shown on the drawing.

Over each pit at the apex of the roof there is a wooden ventilator 4 ft. 4 in. square inside with wooden slats on all four sides. The smokejack is shown in detail. The portion above the roof is 3 ft. square with a frame made of 2 in. by 2 1/4 in. angle irons. The portion extending below the roof is flared

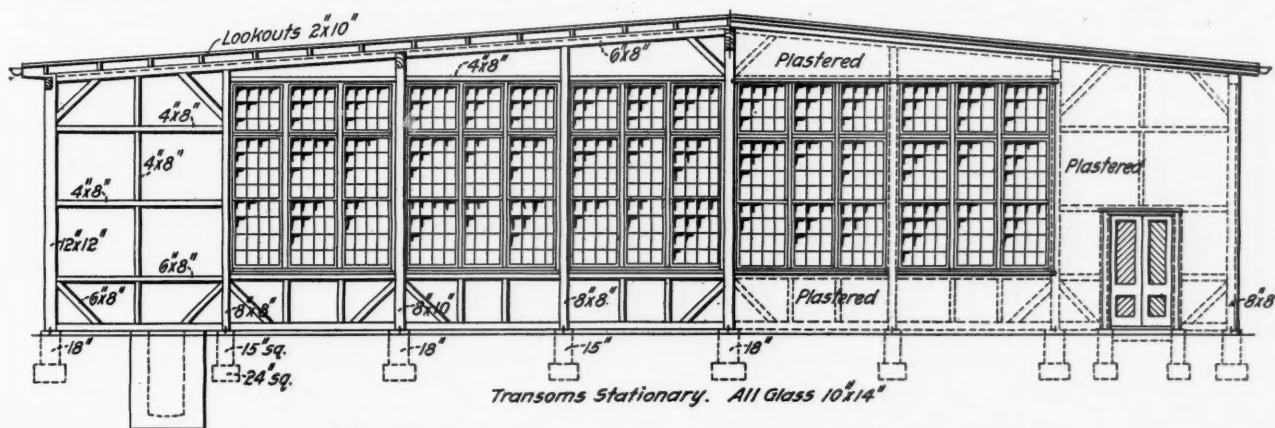


Cross Section Through Roundhouse.

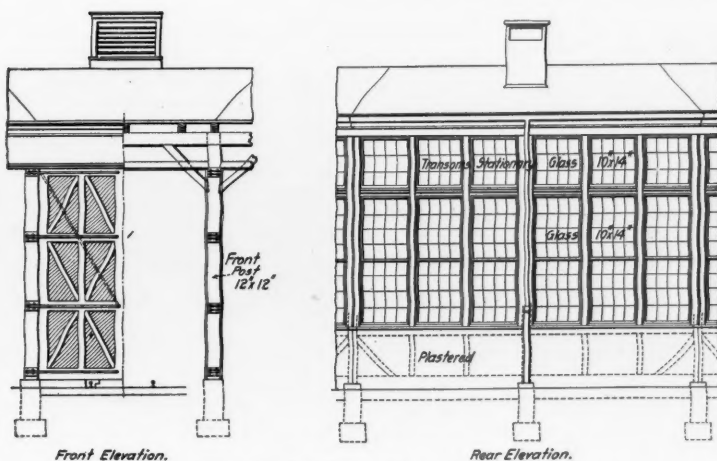
expanded metal which is covered with a heavy coating of cement plaster which forms the finish of the walls, outside and in. The inner wall has solid doors with diagonal battens and the short space between them and the roof plate is likewise finished with expanded metal and plaster, no masonry being used in the superstructure. The post foundations and pit walls are all of concrete and the floor consists of 8 in. of cinder, 4 1/2 in. of concrete and 1/2 in. top dressing of cement.

out to a wide funnel 8 ft. long and 3 ft. wide. The frame made of these angles is tied together by 3/8 in. round rods placed about 18 in. apart, and the whole jacket is covered with expanded metal and cement to prevent the iron from rusting. This jacket is shown in detail in our illustration.

There are three drop pits, each of them extending under two tracks. Two of the pits are for driving wheels and there is a smaller one near the outer wall for engine truck wheels.



Showing Framing. Showing Finish.  
Elevation of End Walls; Wabash Roundhouse at Decatur, Ill.



Front and Rear Elevations.

The driving wheel pits are operated by the pneumatic jacks shown in our illustration. Each jack is made up of three 9-in. cylinders with piston rods made of 4-in. pipe. The turntable is 75 ft. in diameter and is operated by an electric motor which was installed by George P. Nichols & Bro., of Chicago. The pits are 66 ft. long and the rails are supported on wooden blocks 8 in. x 12 in. bolted in the masonry.

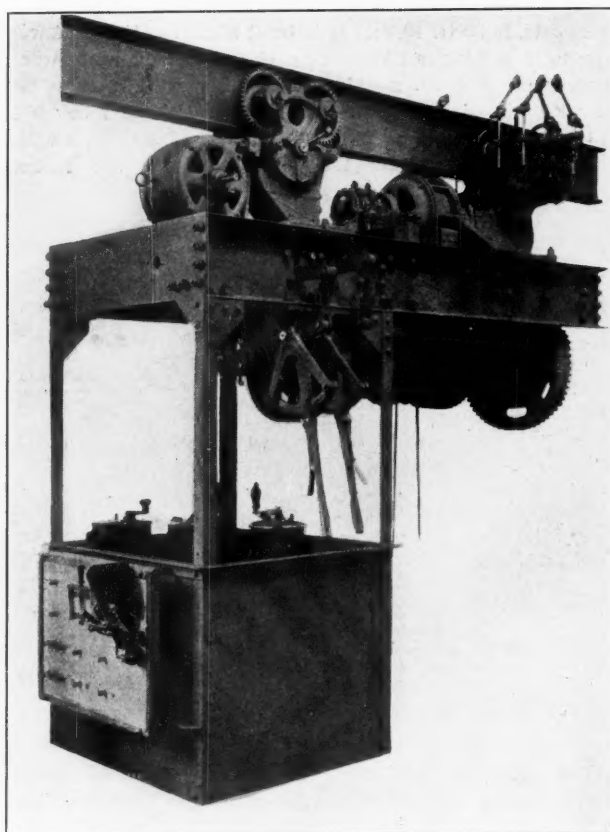
The house is heated by steam and the radiation supplied by 2-in. pipes placed alongside the pit walls, four on each side, under a ledge in the masonry. There are four 80-h.p. boilers for heating the roundhouse, office, machine shop and for supply to the coach yard; these are the old boilers which were formerly used for the shops.

The house is lighted by incandescent lamps, six lamps being suspended between each pair of pits. The electric current is supplied from the power house at the car

shops, about  $1\frac{1}{4}$  miles east of the locomotive terminal, and about 300 h.p. of current is used for lighting the house, machine shop and yards, as well as the various electric motors and pumps which are used about the plant. The current is transmitted at a voltage of 7,200 and a step-down to 440 volts at the motors. There is also a step-down to 110 volts for the incandescent lighting system.

The house is supplied with compressed air for power purposes by a compressor driven by a 75-h.p. motor and supplying 375 cu. ft. of air per minute. The main air pipe overhead in the house is  $1\frac{1}{2}$  in. in diameter. Six feet from the outside wall there is suspended from the roof purlins a single line of 12 in. I-beams  $31\frac{1}{2}$  lbs. per foot completely encircling the house. These support an overhead trolley, driven by an electric motor and having a capacity of 2 tons. This is found very convenient in transferring wheels, heavy castings and other similar material.

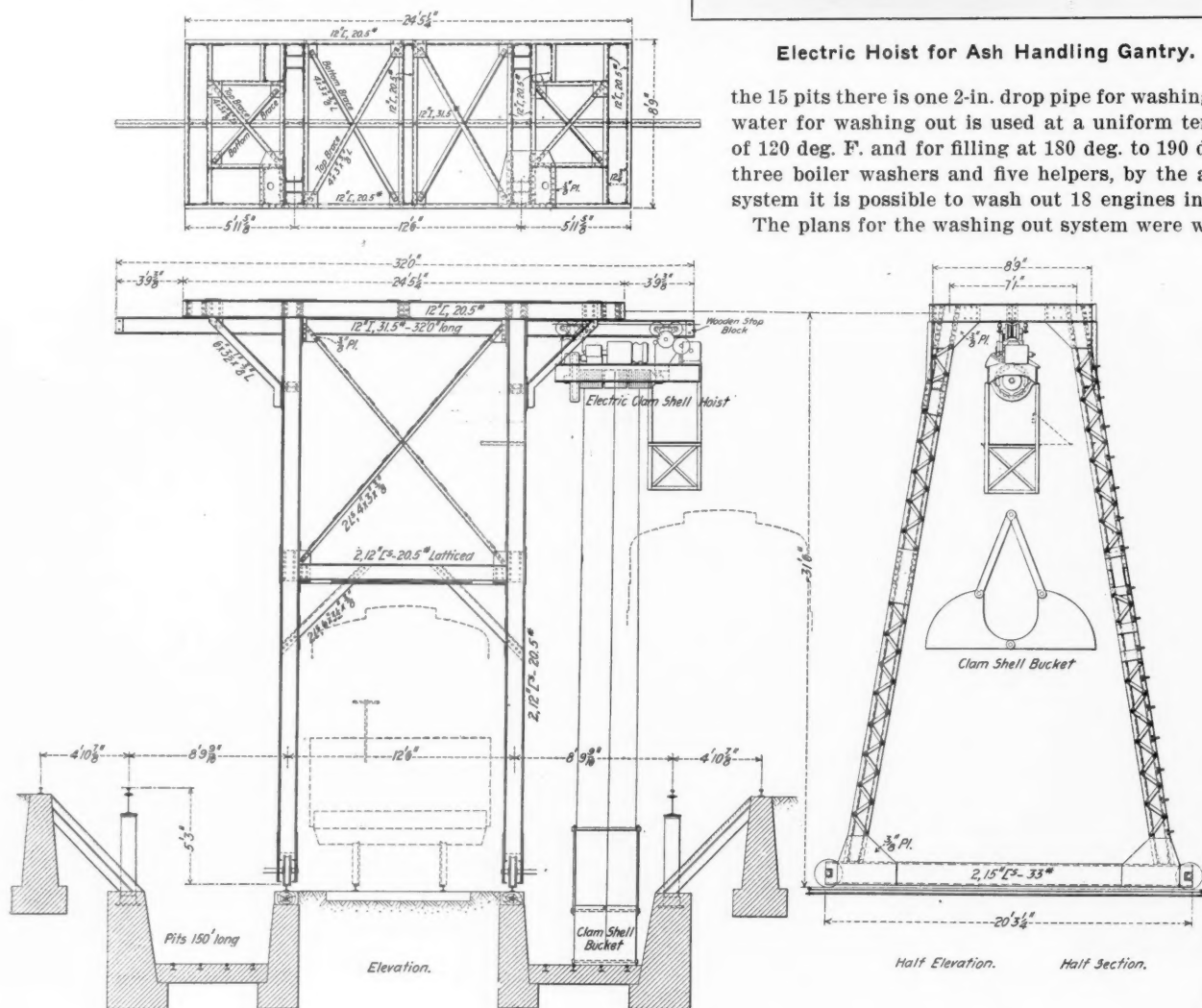
The water supply is obtained from the city at a cost of 4 cents per 1,000 gal., and on account of the economy due to the washing out and filling system the cost of water for washing out and filling is at the rate of only \$16 per month. The house is fitted with pipes for blowing off and filling up boilers through the whole of the 42-engine stalls and for washing out boilers through 15 stalls. The overhead mains for this purpose consist of an 8-in. pipe for blowing off, one 4-in. pipe for filling up, one 3-in. pipe for washing out, two circulating pipes, each 2 in. in diameter for the washing out and filling system and one 6-in. superheater pipe. At each central post between the pits there are two 2-in. drop pipes, one for blowing off and one for filling boilers, and in addition in each of



Electric Hoist for Ash Handling Gantry.

the 15 pits there is one 2-in. drop pipe for washing out. The water for washing out is used at a uniform temperature of 120 deg. F. and for filling at 180 deg. to 190 deg. With three boiler washers and five helpers, by the aid of this system it is possible to wash out 18 engines in 24 hours.

The plans for the washing out system were worked out



Electric Gantry Crane for Handling Cinders; Wabash Terminal at Decatur.





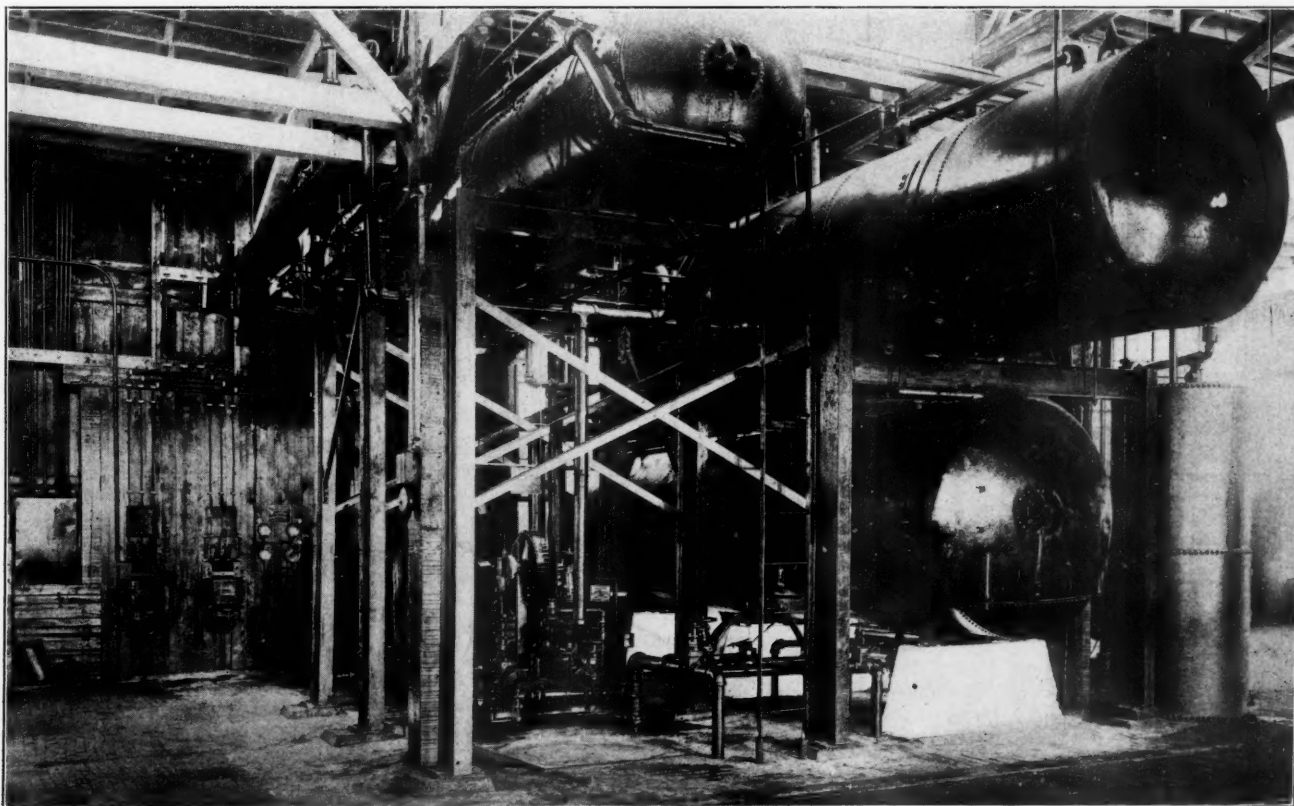
Overhead Pipes for Hot Water, Blow-Off, Wash Out and Filling.

by W. A. Hopkins, electrical engineer, and the plant was installed and is being operated under patents owned and controlled by the National Boiler Washing Co. The system consists of a series of storage tanks, pumps, thermostats and regulating valves, as shown in the half-tone illustration. The operation of the system is as follows: The blow-off line is connected to the water leg of the locomotive and the pressure of steam in

the boiler forces the water and steam into a wash-out tank which is so arranged that the steam is separated from the water, going into a separate tank where it is condensed and used for filling purposes. The mud and water goes into the lower tank where the water is filtered so as to be available for use again. The water in the lower tank varies from 140 deg. F. to 200 deg., and it flows from here to another tank which is automatically controlled by a thermostatic valve to admit cold water to temper the water for wash-out purposes so that a uniform temperature of 120 deg. F. is supplied. Electrically driven triplex Dean pumps, controlled automatically by a mechanical device, maintain a constant pressure of 80 lbs. on each of the hose's nozzles, regardless of the number of nozzles in use. These pumps have a capacity of 350 gal. of water a minute and the operation of a valve in a drop pipe in the roundhouse starts the pumps into action.

After the engine is washed out, it is filled with water taken from the upper tank. This water is maintained at a temperature of about 180 deg. F. The capacity of the pump for filling is 350 gal. per minute, and under a pressure of 175 lbs. it takes only about 10 min. to fill a boiler, whereas, under the old system, it took 30 to 35 min. The system is so arranged that it is possible to change the water in a boiler and give it a fresh supply in 20 min. without removing the fire. It is also possible with the largest locomotives to blow off, wash the boiler, fill it again and obtain 100 lbs. steam pressure in 1 hr. and 45 min. With the use of hot washing water and filling water, maintained at uniform temperature, it is possible to do this quick work without danger from unequal expansion affecting the firebox, tubes or staybolts. Under the old system of washing out and filling, it takes from 5 to 8 hrs. to wash out and fill an engine and get up 100 lbs. steam pressure. The saving in water used amounts to about 60 per cent., as under the old system the water was allowed to run to the sewer while in the new system it is used over and over again.

An interesting auxiliary to this filling system is an additional tank which acts as a superheater. The water is forced



Plant for Washing and Filling Boilers with Hot Water; Wabash Terminal at Decatur.

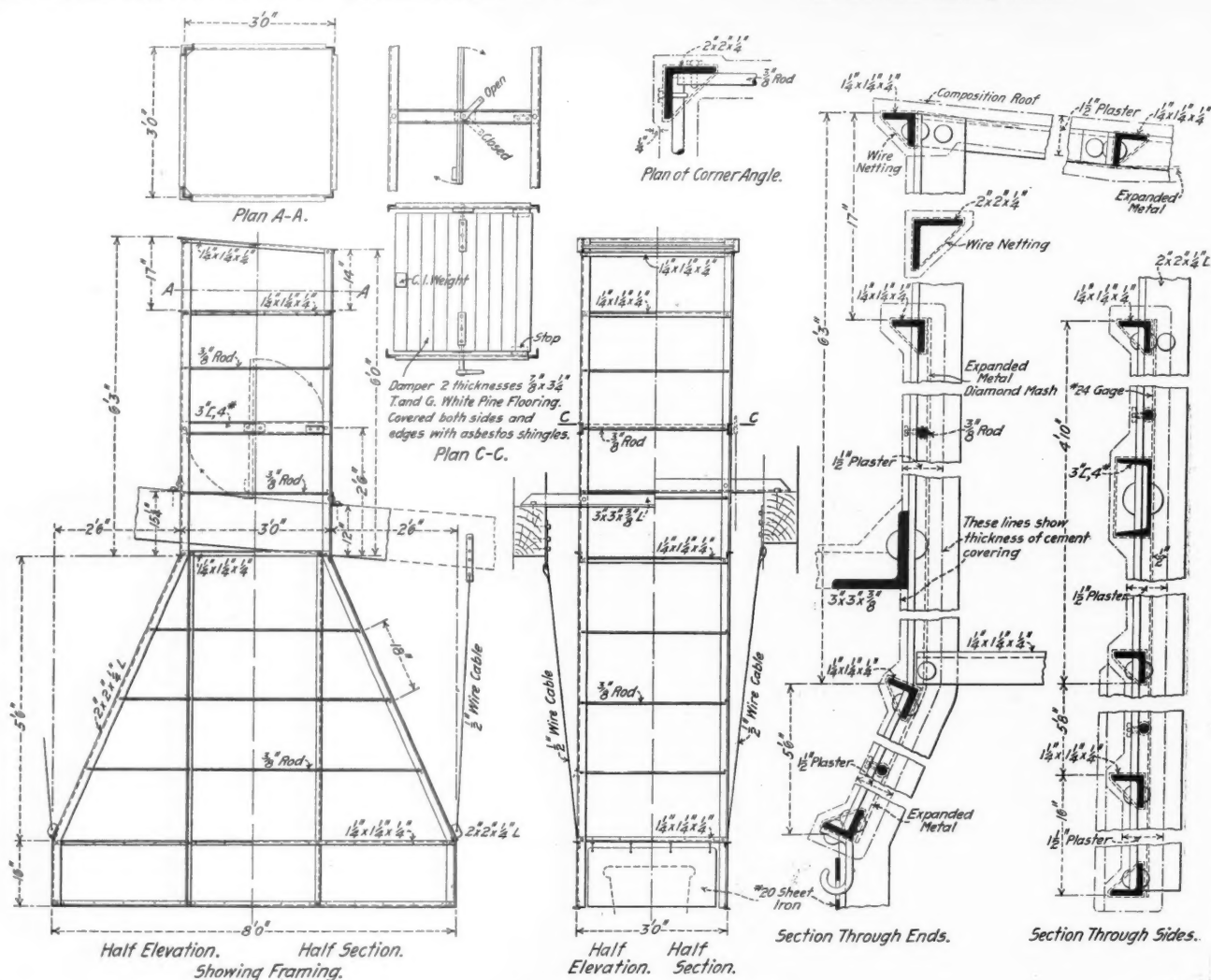
by pumps through this superheater, which is jacketed with live steam from the locomotive, by means of which the temperature of the water is raised from a minimum of 200 deg. to a maximum of 320 deg. This gives ordinarily a steam pressure of 100 lbs. in the boiler of the locomotive when supplied with this superheated steam, and it is sufficient pressure to use for the blower or to move the engine without building a fire.

The automatic electric control for the pumps in this plant was worked out by the Cutter & Hammer Co., of Milwaukee, Wis., while the Mason Regulator Co., Boston, Mass., designed and furnished the mechanical controlling valves for the pumps.

The cinder pits are shown in cross section in the drawing illustrating the gantry crane. The pits are 150 ft. long and 10 ft. deep. There is a central depressed track for the cinder cars, and on the same level on each side of this track are rails, laid to a gage of 12 ft. 6 in., to provide a runway for the gantry crane. On the outside of each storage pit there is a steep inclined ash pit; the center of the tracks over these pits is 17 ft. 6 in. from the center of the central depressed track. The outside rail of the ash pit is supported directly upon a concrete pier while the inside is laid on a 12-in. I-beam supported by cast iron posts spaced 6 ft. 6 in.



Ash Pit and Gantry Hoist.



Steel Smokejack for Wabash Roundhouse.

centers. The gantry is built up with a base carrying the wheels which is made of two 15-in. channels 33 lbs. per foot. The legs are made of 12-in. channels 20 lbs. per foot connected by lattice bracing. The upper portion of the gantry has 12-in. I-beams extending out so as to support the trolley when the bucket is at the extreme edge of the storage pit.

The ashes are handled by a clam-shell bucket having a

capacity of  $1\frac{1}{2}$  cu. yds., and are delivered entirely by power from the pit to the car. The pits are capable of taking care of ashes from 185 engines, and two men working three hours in day time take care of all the ashes from these engines in 24 hrs. The hoisting motor is 11 h.p.; the traverse motor 10 h.p., and the trolley motor 6 h.p.

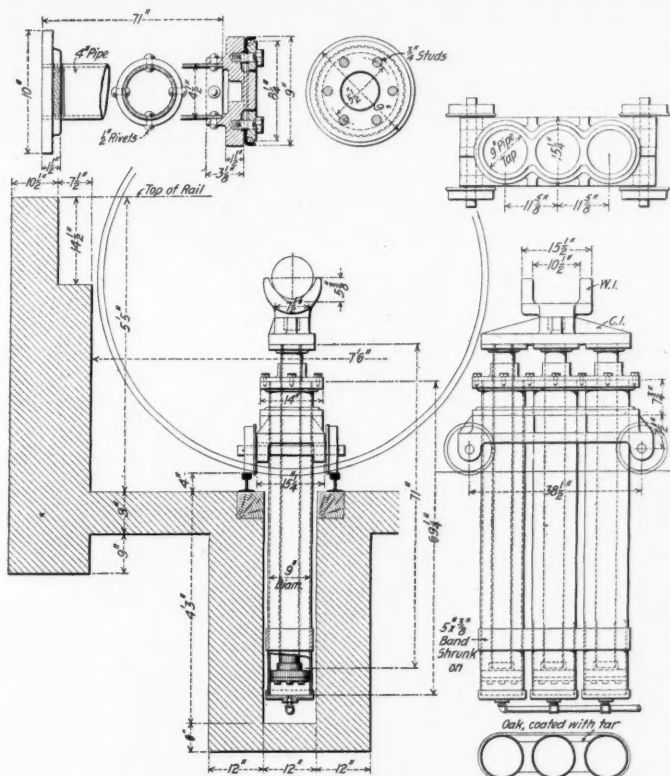
The general plan of the gantry was made by A. O. Cun-



ningham, Chief Engineer, and W. A. Hopkins, Electrical Engineer. The steel work was built by the Decatur Bridge & Iron Works, and the crane outfit was furnished by the Case Manufacturing Co., of Cleveland, Ohio.

The sand house is 15 ft. wide and 70 ft. long and has an elevated tower for gravity flow; the sand will be elevated by a conveyor driven by a 5 h.p. electric motor.

The coaling plant is very compact, occupying a space only about 35 ft. square, but it has a capacity for handling 600 tons in 10 hours, and two men working at night supply all the coal required for the locomotives at the terminal in 24 hrs. The cost of handling coal at this station is remarkably low, being only 1¼ cents per ton. There is only one apron on each side for delivering coal to the tender. There is a central track for hopper bottom coal cars which deliver coal to an underground pit, and it flows from this pit to large rectangular buckets which are hoisted by electric motors and delivered directly to the locomotives. The hoist is operated



### Pneumatic Jack for Driving Wheel Pits.

by a 10-h.p. electric motor, and is capable of delivering 60 tons of coal per hour. The station has a storage capacity of 280 tons and most of the engines coal at night. The coaling plant was furnished under a contract with Fairbanks, Morse & Co.

The plans of the terminal were made under the direction of A. O. Cunningham, Chief Engineer, and the mechanical and electrical details by W. A. Hopkins, Electrical Engineer, with the approval of Henry Miller, Vice-President and General Manager, to whom we are indebted for drawings.

**CARDING OF CARS.\***

BY J. E. STUMPF.

Superintendent of the Moberly Division of the Wabash Railroad.

It will be conceded that a proper system of carding is almost an absolute necessity in the prompt handling of cars in, through and from terminals. It is the custom on many roads to use chalk for marking cars arriving at terminals on either local or through freight trains, which are destined to industry or freight house tracks within the terminal, or for movement on local trains to nearby points; and for this service

\*A paper read at the annual meeting of the Central Association of Railroad Officers at Peoria, Ill., October 14-16, 1908.

chalk-marking probably is preferable to carding, for the reason that, as a rule, the number of movements necessary to place the car at its unloading point is too small to justify the work and expense of carding. But in large terminals, where industry tracks or interchange tracks with other lines are widely separated, the use of special switch cards would prove an advantage, these cards to be put on cars by yard clerks after arrival of cars. For cars destined to distant points on other roads, or even for movement between divisions or through several terminals of the home road, the necessity of a comprehensive system of carding is at once apparent.

In putting such a system into effect the first question that arises is the form or style of card that will best serve the purpose and convey sufficient information, without giving that which is unnecessary. There is such a lack of uniformity in the carding systems of railroads that it would hardly be practicable to card cars through from point of origin to destination on a connecting line, except with a very simple form of card, giving barely the billing point, destination, contents, tonnage and routing. But, for the information of yardmen and trainmen on the home road, it is possible to elaborate a system that will result in keeping cars for one station, territory or division together in trains, which, of course, adds greatly to the facility and speed of yard handling.

As nearly all railroads now refuse cars not equipped with air-brakes, there is no such trouble experienced in properly grouping cars by stations, territories or divisions as was common a few years ago, when the smaller proportion of air-brake cars in use often made necessary the placing of cars for the same territory in different parts of the train.

As to the form of card or cards to be used, inasmuch as it is generally the custom for yardmen to make up trains, giving them the tonnage rating of the engines, from the information shown on the cards, it would seem that, whether a car be destined to a point on the home road or on another line, it should have enough information to enable the yardmen of either the home or a foreign line to handle it intelligently. But it is a question whether it is advisable to include very full information as to contents in the case of merchandise or other lading which is particularly subject to pilfering, as it is a well-known fact that a great many of the claims which deplete the treasuries of railroads are directly chargeable to an injudicious advertisement of the exact contents of cars on car cards. These are the only source of information generally accessible to car thieves.

The object of expediting the movement of a car containing perishable or specially important freight may be as well, or better, attained by using for this class of freight a card of striking color, such as red, containing the same information as the plain card used for ordinary freight, the yardmen and trainmen being fully posted as to the importance of prompt movement of cars so carded.

This system is in vogue on several large trunk lines, where the color of the cards, as well as of the waybill envelopes in use, has given rise to the name "Red Ball," as descriptive of manifest or important freight cars.

It will be found an advantage, however, in addition to such carding, to have numbered cards affixed to the cars, solely for the information of yardmen and trainmen of the home road, such cards to be assigned to certain territories, divisions or large terminals, even numbers to be used for south or east bound cars and odd numbers for north or west bound cars. If a division of the road be made into such territories and a card assigned to each, it will be a very simple matter to group cars in trains in a satisfactory manner.

In affixing cards to cars it is of the utmost importance that they be placed on both sides of the car, on account of the different situations of yards, some switching on the right-hand side and some on the left-hand side. Cards should be large enough so that designating numerals may be readily distinguished by lantern light during the night.

The expense of a simple but practical system of carding need not be excessive, as the cards may be put on at originating point or at the junction point where cars are received by the home road by the regular yard clerks.

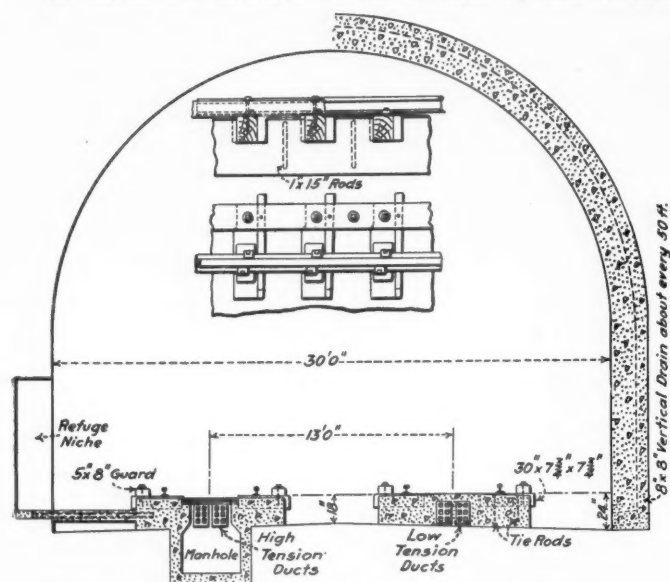
At many terminals trains are now being switched in accordance with switch lists either furnished by the conductor on arrival or compiled by the yard clerk when bills are delivered to him, but the installation of a good system of carding, supplemented by the use of chalk-marking for cars in local delivery or local forwarding movement, would act as a double check and insure more prompt and proper handling.

#### TRACK SUPERSTRUCTURE IN TUNNELS.

The Pennsylvania is considering the type of track shown in the accompanying drawing for use in its tunnel on the New York-Long Island extension. This design was suggested by a committee of the company's engineers after a study of many existing and proposed types. It is designed to satisfy the conditions of smooth riding, durability, ease of cleaning, and economy of maintenance and renewal.

The tunnels are lined with concrete, and in this are set treated red oak blocks, 7 in. thick, 10 in. wide, and 2 ft. 10 in. long on the bottom face. They are spaced 20 in. apart, center to center, and beveled at the ends, making the blocks 2 ft. 6 in. long on top. The outer end of the block fits into the concrete, as shown, the overlapping ledge of concrete being strengthened by a  $\frac{3}{4}$ -in. twisted steel rod. At the outer end of the block, the upper surface of the concrete comes to within  $\frac{1}{2}$  in. of the top of the block and slopes down towards the inner end, so that at the rail it is 1 in. under the top of the block. The face of the concrete between the rails is made flush with the ends of the blocks, and at the center of the track it is 2 in. below the bottom of the track, forming a drainage channel.

The blocks are anchored to the concrete by one or two

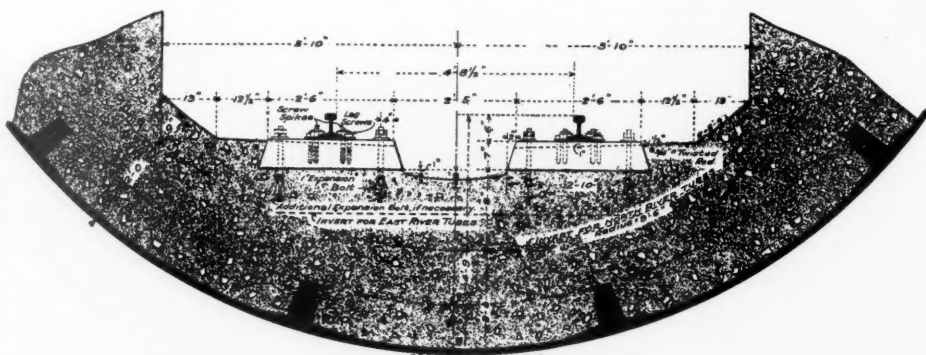


Tunnel Tracks; Delaware, Lackawanna & Western.

expansion bolts. The 100-lb. rails, 60 ft. long, rest on  $\frac{5}{8}$  in. x 7 in. x 12 in. tie plates. The plates are fastened to the blocks by two lag screws, and the rails are fastened by clips held by screw spikes. It is proposed to try cow hair felt cushions between the tie plates and the blocks, although these are not now thought to be necessary.

The Delaware, Lackawanna & Western has adopted a similar design for its new tunnel through Bergen hill. This is shown in an accompanying drawing. The blocks are 8 in. x 8 in. x 2 ft. 6 in. and are spaced 22 in. apart on centers. They are set in the concrete as the latter is laid. One side is notched at the outer end, and on the other side is a tapered wedge block, which is driven in to hold the block tight against the concrete. The wooden guard rail is fastened to the tie blocks by lag screws and anchored to the concrete between the blocks by bolts. The wedge is held in place by a lag screw through the guard rail. When a block is to be renewed, the rail fastenings are released and the lag screws holding the block and the wedge are removed. The wedge is then driven out and the block is moved forward to clear the shoulder in the concrete and then slid out endwise.

The blocks are to be creosoted, about 12 lbs. of creosote being used for each one. The rail rests on a plain wrought iron  $\frac{5}{8}$  in. x 6 in. x 12 in. tie plate, and is fastened with wrought iron rail clips held by lag screws. Each tie plate

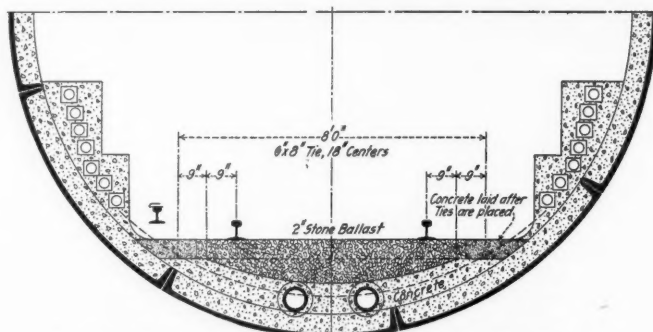


Proposed Track Superstructure; Pennsylvania Tunnels.

is to be punched with four holes, so that if the timber is worn out under one pair of holes, or the top of a lag screw is twisted off or corroded, the other set of holes can be used. Iron instead of steel is specified for clips and tie plates as being less liable to rust, and wrought iron instead of cast iron is used for the clips, as it can be better fitted to the flange of the rail.

The space in the center of the track is not used for a drainage gutter, as in the Pennsylvania design, as this space is needed for wire ducts, and, anyhow, it is not expected that there will be enough water to require any such provision. The accompanying drawing, showing half-sections at two points in the tunnel, shows both low tension and high tension ducts. The latter are not now necessary, and provision is made for them only because of a possible future need.

The standard construction on the Interborough Rapid Tran-



Section Between Ties; Interborough Rapid Transit.

sit subway is also shown herewith for comparison with the other designs. The concrete is first laid on the lining, being finished with flat surfaces under the ends of the ties as shown. The ties are then laid and additional concrete laid about their ends, while the center of the track is filled in with loose ballast.



**ELECTRIC OPERATION OF THE ST. CLAIR TUNNEL.\***

Electric locomotives have, since May 17, 1908, been used for all traffic in the St. Clair tunnel, on the Grand Trunk, between Sarnia, Ont., and Port Huron, Mich. The system was installed by the Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., which supplied five engines at first and, later, two more. This company has been operating the tunnel for the last few months, but the Grand Trunk will take it over on November 12. It is too early to get full data on the comparative economies of the new and old methods of train haulage, but certain advantages of this electrification are already evident.

With steam operation, tank locomotives of the 0-10-0 class were used. The 2 per cent. grade in the tunnel limited the capacity of these locomotives, and heavy freight trains arriving at either terminal had to be broken up into sections to suit the hauling power of the engines. This dividing up of the trains resulted in a rather acute congestion in the yards, and

energy, not only for train operation, but also for the drainage pumps and the electric lighting of the tunnel, stations and yards. The locomotives are single-phase and weigh 66 tons each. They are six-wheeled, and each of the three axles has one 250-h.p. electric motor connected to it. The drivers are 62 in. in diameter. The current is collected from an overhead contact wire at 3,000 volts by a pantograph collector bow. Inside the locomotive there is a transformer, which reduces the pressure from 3,000 to about 240 volts for use in the motors. There is also a special blower equipment, which provides a continuous supply of fresh air for cooling motors and transformers. Normally, two of these locomotives are operated together, and they are so arranged that each pair can be made to form a single unit of 132 tons and 1,500 h.p.

The steam locomotives could scarcely haul a 700-ton train, while the electric locomotives handle a 1,000-ton train from terminus to terminus within the specified time of 15 minutes.



Two Locomotives, Hauling Heavy Freight Train; St. Clair Tunnel.

the necessary switching added further complications to the train movement.

Another trouble lay in the atmosphere of the tunnel. The smoke and gases from the locomotives constituted not only an element of discomfort to passengers, but also an element of danger in the operation of trains. The suffocating air threatened asphyxiation whenever a train was stalled in the tunnel, and the obscuring of the signals jeopardized the safety of travel.

The tunnel is 6,032 ft. long. The central part, 1,718 ft., under the river bed, has a grade of 0.1 per cent. eastward for drainage. The rest has a 2 per cent. grade and the yards at either terminal are nearly level. The approaches of the tunnel up to about 300 ft. of the portals are double tracked, but the track through the tunnel proper is single. The total zone of electrification extends over about four miles.

A power station was built at Port Huron. It contains two 1,250-kilowatt generating units, which provide electrical

Indeed, a record has been established of 11 minutes with a 930-ton train. Running trains in sections, formerly imperative with steam working, is entirely obviated, and the whole movement of the traffic in both directions is considerably more economical and efficient, the traffic capacity being increased more than one-third. In connection with the handling of freight trains, it is worth recording that air brakes can now be successfully employed. With steam working, the use of air brakes was rather dangerous. In the event of a train breaking in two in the tunnel, the time necessary to recouple the sections and release the brakes exceeded the interval within which the locomotive could be kept in the tunnel without causing suffocation to the crew. With electric operation, severing the train line at once causes all the air brakes to be applied, and the locomotive can remain in the tunnel as long as required.

The passenger agent reports that the elimination of smoke and cinders from the tunnel has added to the personal comfort of passengers to such an extent that it has already greatly increased the passenger revenue of this part of the

\*From the *Electric Trunk Line Age*, published by Muralt & Co., Engineers, New York.

line. Another noticeable effect of the better atmosphere is in the reduced depreciation of the passenger coaches. The cleaning and painting of the car bodies is now less frequent than with steam operation.

#### A LAWYER'S VIEW OF RATE LITIGATION.\*

I believe that it can now be said without fear of contradiction that the following propositions are thoroughly established as to the relative rights of the public and the owner in fixing railroad rates: That each is entitled to a voice in the matter; that if the public (as represented by Congress or the state) fixes a rate the owner has the right to appeal to an impartial arbitrator—a court of justice—as to the reasonableness of the rate so fixed; that neither Congress nor a state can, by any device of any kind whatever, deprive the railroad of this right of appeal; that all penalties designed or whose effect is to prevent this appeal are invalid.

I do not see how any fair man could challenge the justice of any of these propositions. As Mr. Justice Peckham said in *Ex Parte Young*:

"Over eleven thousand millions of dollars, it is estimated, are invested in railroad property owned by many thousands of people who are scattered over the whole country from ocean to ocean, and they are entitled to equal protection from the laws and from the courts with the owners of all other kinds of property—no more no less."

Congress has never attempted to pass any act fixing rates. Under the original Interstate Commerce Act it provided a tribunal which, on inquiry either on its own initiative or by complaint of someone interested, could determine whether a particular rate in force by the carrier was reasonable under the circumstances, and if the Commission held it to be unreasonable it could order the carrier to desist from the charge, and the carrier refusing so to do could be compelled, at the suit of the Commission, to obey the order. But while the Commission could declare that a particular rate was higher than it should be it had no power to substitute another rate. Under the Hepburn law there has been this much change—the Interstate Commerce Commission can, on complaint but not on its own initiative, declare a rate unreasonably high and fix a rate which in its opinion should be substituted for the higher rate, and the courts can enforce this order; but the carrier is allowed to go into a court of equity and have the whole matter examined judicially, and if proper grounds are made, suspend the new rate pending the litigation. The Interstate Commerce Commission cannot upon its own initiative make a new rate.

While the railroads have from time to time been successful in their appeals against schedules of rates, yet they have been rarely if ever so successful in resistance to one special rate. How far this "sniping" will continue cannot be told. One thing, however, I regard as sure. If there is no change in the public temper as to railroads, if they are to continue to be the marks of the demagogue and stump orator, if there shall not arise and increase a healthy public sentiment demanding equal justice for this kind of private property, then it is doomed to destruction. Appeals to courts are well enough for a time,—a considerable length of time,—but there is but one real power in a free government, and that is the legislative power. It can make and unmake courts; it can here curtail jurisdiction and there cut off power to enforce decrees. Let me illustrate. During the administration of the elder Adams Congress passed an Act creating a number of circuit courts. Judges were appointed and duly confirmed. Under the Constitution they held for life. But when Jefferson became President this Act was repealed and, of course, thereafter no appropriation was made for the pay of these judges, and no provision for their holding any courts. It was a case of *ex eunt omnes*.

\*From an address by Alex. P. Humphrey, General Counsel Southern Railway, before the American Association of Freight Traffic Officers at St. Louis, September 12, 1908.

After the Civil War Congress passed certain laws carrying out its policy of reconstruction. Cases arising under these laws and challenging their validity went to the Supreme Court. After argument and while under submission Congress passed an Act taking away the jurisdiction of the appeals. The Supreme Court, on their attention being called to this Act, dismissed all the cases.

There is not a single Federal court that is not in the power of Congress. As all Federal courts except the Supreme Court owe their being to Acts of Congress, these can all be repealed. The Supreme Court would remain. But it has no constitutional jurisdiction of a practical importance to the ordinary citizen, and it is dependent on Congress for its clerk, its marshal, its court room, the number and pay of its judges. As for state courts, the judges are sometimes appointed by the Governor; in other cases, elected by the legislatures, and in most cases by the people. Their terms range from life, through twenty-one years, to four years. The cases which they can hear and the means of enforcing their judgments are practically all at legislative will. Besides, judges are not men apart from other men. They are not selected or elected from or by minorities. Constitutions and courts are essentially brakes on the wheels of majority rule. They serve the purpose of affording time and opportunity for the sober second thought.

From all this it follows that for justice and protection to any private interest against a persistent and continued assault the courts cannot be a permanent bulwark. Railroad owners must therefore look to the people at last for this justice and protection. They must be able and willing to plead their cause in the popular forum. It is fatuous to remain silent, and in doing so we lay upon our courts a burden they cannot bear and should not be expected to sustain.

#### THE GAGE OF SPANISH RAILROADS.

The gage of the principal railroads in Spain has become a matter of serious importance as affecting the development of the country. The present standard gage of 1.67 meters (5 ft. 5¾ in.) was adopted in 1845 upon the recommendation of a commission of engineers of the *Caminos* (Public Works) because "it would permit the operation of locomotives of great evaporative power at high speeds without endangering their stability."

In 1852 Signor Reinoso, minister of public works, saw the technical mistake that had been made and urged the adoption of the 1.44 meter gage (4 ft. 8.69 in.). It is to be regretted that his recommendations were not followed, for, at that time, there were but 279 miles of railroad in the country. But the suggestion was disregarded and the law of 1855 definitely fixed the gage at 1.67 meters in accordance with a report rendered by a commission under the chairmanship of the Marquis del Duero.

One of the arguments in favor of this gage, in spite of the greater cost and the decreased flexibility, was that of national defence. The effect of these mistakes is now being emphasized and the proposal to change the gage to that of the French lines (4 ft. 8.69 in.) is under discussion in order to avoid the delay and expense invoked in the transshipment of passengers and freight at the frontier. Owing to the cost, the out-and-out change of gage is apparently impossible and the railroad commission is opposed to the use of a third rail because of the dangers involved in the operation of rolling stock of different gages at the same time. But the commission is of the opinion that any new lines that may be built in the north or northeast should be of the standard European gage of 1.44 meters. It is further suggested that when double tracking is undertaken it should be done with the European gage. It is recognized that during the transition period, there will be difficulties of operation, but this is regarded as unavoidable.—*Journal des Transports*.



## General News Section.

According to a press despatch from Vancouver the Canadian Pacific is going into the coal business. The company has 100,000 acres in the Elk Valley where the deposits are said to be enormous. Under the terms of the land grant the Canadian Pacific was forbidden to mine any coal before Jan. 1, 1909. The company has a large coke plant at Hosmer.

The Lake Shore & Michigan Southern has made a reduction in the freight rate on brass foundry rumbler mud, C.L. from Buffalo to Dunkirk, and from Dunkirk to North Tonawanda. This we learn from a circular issued under the authority of the People of the State of New York, by the grace of God free and independent, through their Public Service Commission.

The Industrial Department of the St. Louis & San Francisco reports that 266 industrial plants, employing 7,954 men and representing an investment of \$5,590,000, were located along the lines of this road during the last fiscal year. The same department of the Chicago, Rock Island & Pacific announces that 290 new industries were established along the lines of that road during the last year. The promoters are estimated to have spent over \$9,000,000 on the plants, and they expect to employ nearly 9,000 men.

Officers of northwestern roads fear there will be a shortage of fuel in the northwest this winter. They made inquiry several weeks ago as to the supply of fuel on hand and urged dealers to make their shipments early, but their warnings have been generally disregarded. The roads sent out circulars to dealers and also sent traveling freight agents to urge them to make their purchases early; and railroad officers think that if there is a fuel shortage this year they can with good conscience wash their hands of the responsibility.

The government has begun prosecutions for violation of the Safety Appliance Act against the following railroads: Atlantic & St. Lawrence; Chicago & Alton; Chicago & North-Western; Chicago, Burlington & Quincy; Chicago Great Western; Duluth, South Shore & Atlantic; Erie; Fort Worth & Denver City; Indiana Harbor Belt; Iowa Central (9 cases); Louisville & Nashville; Missouri Pacific; Nashville, Chattanooga & St. Louis; Newport & Sherman's Valley; Northern Pacific; St. Louis, Iron Mountain & Southern (13 cases); St. Louis Southwestern; Sumpter Valley Railway and Oregon Lumber Company (13 cases); Trinity & Brazos Valley; Yazoo & Mississippi Valley and Illinois Central (11 cases). The total number of violations charged is 73.

### Unique History in the Making.

Unique in the history of Presidential elections are the arrangements made by one of the great railroad systems to furnish the election returns to passengers on its trains all through election night. The Burlington has installed a direct telegraph wire in the *Chicago Tribune* office for this purpose. The bulletins will be posted in conspicuous places in all through trains and will be placed on board at every stop, and wherever regular stops are infrequent, special stops will be made for this purpose, if necessary [and according to the degree of excitement manifested by the passengers; also conditioned on whether or not the engine needs water]. This innovation is one which will be much appreciated by the voter who has made a special trip to his home town for the sole purpose of voting and who is obliged to depart the same day. With a national election as the stake, it is easy to picture the excited groups of passengers crowding around these train bulletins to get the latest news. There will be the same eagerness, the same discussions, the same I-told-you-so's that are so characteristic of the election night crowds in any of our big cities. Only numbers will be lacking. And all the while the trains will be rushing along through the night at express train speed [18 to 81 miles an hour].—From a circular by Mr. Eustis; abridged and amended; no charge.

The roads which gave election returns on their trains elec-

tion night were, so far as we have heard, the Lake Shore & Michigan Southern, the Chicago & North-Western, the Chicago, Burlington & Quincy, the Atchison, Topeka & Santa Fe, the Pennsylvania Lines, the Chicago, Milwaukee & St. Paul, the Chicago, Rock Island & Pacific, and the Michigan Central. The Missouri, Kansas & Texas gave the returns on the "Land Men's Special," leaving St. Louis Tuesday evening.

### New York and New England Association of Railway Surgeons.

The eighteenth annual meeting of the New York and New England Association of Railway Surgeons will be held at the Academy of Medicine, New York City, on November 17 and 18, 1908, under the Presidency of Dr. F. A. Stillings, of Concord, N. H.

The entire morning session of the first day will be devoted to a symposium of the following subject, "What Are the Causes Leading to Railway Accidents and what Remedies Can Be Suggested?"

The various features of this subject will be presented by eight authors, and about 20 chief surgeons and claims attorneys will take part in the general discussion. Railroad officers and all members of the medical profession who are interested in this work are cordially invited to attend this meeting.

### The Railway Business Association.

The following excerpt has been taken from the address of George A. Post at Pittsburgh, Pa., Oct. 29:

The Railway Business Association has set out to make friends for the railroads. We have a direct and vital interest in bringing about a better understanding between the railroads and the public. If we succeed, it will be greatly to our advantage. We do not seek to cloak our personal interest in the welfare of the railroads. We are proud of it.

The Railway Business Association is unique. It proposes to go to the American people and discuss railroad economics without any trace of rancor, and with no possible connection with office getting. One of the most serious troubles with the proper adjustment of railroad problems is that the people rarely hear railroad matters discussed except in the heat of a political contest, and by men who want to be elected to some office. The men who compose the Railway Business Association don't want to go to Congress, to the legislature, or be governor, nor hold any other office. They couldn't afford to do it. All they want is business. If they can get business, that will mean prosperity, not alone for them, but work, comfort and prosperity for their workmen. The Railway Business Association proposes to fill the minds of workingmen with facts as to the necessity to them of fair play to railroads, so that when the agitator mounts the rostrum and asks for their votes, so he may pound railroads, those workingmen will say to him: "Not for me, old man! If you get your job, I'll lose mine, for there will not be any work for me if railroads are pounded." When we have all those dependent upon railroads so educated, elections will take care of themselves. When public opinion is right, the man who represents it in official place will be sure to be right.

The railroads of the United States have not only enjoyed the opportunity which naturally inheres in the discharge of such a universal function, but, on the whole, they have done their work well. The complaint of inefficiency has figured very little in public clamor. I am not so abandoned in taste as to invite you on this otherwise happy and enjoyable occasion to gather with me around a table of statistics, but you will allow me to give you a brief resumé of how the railroads have done their work, and what they have got for doing it. The cost of building a mile of railroad has risen in twenty years 22 per cent. What did the railroads charge the public for doing the work, and what profit did the proprietors take

on their investment? The average rate of hauling a ton of freight one mile fell from 10.3 mills to 7.7 mills. As for profits, the dividends on stock and the interest on bonds in 1887 were 31 per cent. of the gross receipts, and in 1906 only 24 per cent.

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 ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & F. U. Ry., Peoria, Ill.; November 10-12, 1908.  
 ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; second Friday in month, except June, July and August.  
 SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, 218 Prudential Bldg., Atlanta, Ga.; 3d Thurs. in Jan., April, Aug. and Nov.  
 TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.  
 WESTERN RAILWAY CLUB.—J. W. Taylor, 390 Old Colony Bldg., Chicago, Ill.; 3d Tuesday each month, except June, July and Aug.  
 WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Building, Chicago; first Wednesday, except July and August.

**Traffic News.**

The Federal Court at Little Rock has issued an injunction restraining the Railroad Commission of Arkansas from enforcing against the Little Rock & Hot Springs Western the state 2-cent fare law and the orders of the commission reducing freight rates.

According to the New York *Journal of Commerce*, complaints regarding increases in freight rates are now coming into the office of the Interstate Commerce Commission in great volume. Many of these complaints have to do with rates on coal, meat, lumber and other staple articles.

The Railroad Commission of Louisiana has issued an order, effective on October 25, that the charge of 3 cents per sack for loading and unloading rice at points in Louisiana shall be abolished and that the carload rates already fixed by the Commission shall be applied without any additional charge.

The Manufacturers' Club of Buffalo, N. Y., jointly with the Black Rock Manufacturers' Association, now maintains a traffic bureau in the Coal & Iron Exchange. The manager, William H. Frederick, is to act, where desired, as the agent of the members of these associations in their dealings with the railroads.

The Inspection bureau of the Trunk Line Association has now been in existence 25 years, and, according to an account of its work printed in the *Brooklyn Eagle*, shippers who try to "beat" the railroads by representing goods as low class when they are high class, are as plenty as ever; or, at any rate, are so numerous that each inspector, it is estimated, saves enough on freight bills for his employers to pay his salary six times over.

Members of the Central Passenger Association are considering a plan for pooling the eastbound second class passenger traffic from Chicago and the west, that which goes on through railroad and steamship steerage tickets. While details of the plan have not yet been determined it has been practically decided that four of the differential lines, the Erie, the Grand Trunk, the Nickel Plate and the Wabash shall each receive one-sixth of the business, and the other three differential roads, the Baltimore & Ohio, the Michigan Central, and the Panhandle route will divide the other two-sixths.

The Chicago, Milwaukee & Gary, which is the new name of the railroad heretofore known as the Illinois, Iowa & Minnesota, has issued a notice that it adopts and makes its own in every respect all tariffs, rules, notices, concurrences, traffic agreements, divisions, authorities, powers of attorney and other instruments filed with the Interstate Commerce Commission or concurred in by the Illinois, Iowa & Minnesota. The Chicago, Milwaukee & Gary is an outer belt line at Chicago that connects Rockford with Moline, Ill. All former officers of the Illinois, Iowa & Minnesota became the officers of the Chicago, Milwaukee & Gary.

The railroads in Arkansas have filed freight tariffs to take the place of those made by the Railroad Commission, the enforcement of which has been enjoined by the Federal Court. The new tariffs became effective November 2. They are somewhat higher than the rates fixed by the Commission, and differ in some particulars from the rates that the railroads had in effect before the Commission issued its orders. The situation in Arkansas gave the railroads a chance to make more scientific tariffs than is usually possible, and they sought to take advantage of it. The rates were made after conferences not only with the Commission, but with shippers. However, the Commission and many shippers in the state criticize the new rates severely. The Commission on October 31 issued an order declaring the rates extortionate and unlawful, and prohibiting their collection. It also holds the rates it fixed as just, although the federal court has enjoined their enforcement. A. S. Bragg, manager of the Merchants' Traffic Bureau, Little Rock, is quoted as denouncing the new schedule as an outrage. He says: "It not only affects the wholesaler, but the retailer and every consumer. While I am in favor of high prices and high wages, I do not believe in highway robbery."

The Pennsylvania Railroad also has an educational train.

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**RAILWAY CLUB OF PITTSBURGH.**—J. D. Conway, Pittsburgh, Pa.; fourth Friday in month, except June, July and August.  
**RAILWAY SIGNAL ASSOCIATION.**—C. C. Rosenberg, 12 North Linden street, Bethlehem, Pa.  
**ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.**—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; November 10-12, 1908.  
**ST. LOUIS RAILWAY CLUB.**—B. W. Frauenthal, Union Station, St. Louis, Mo.; second Friday in month, except June, July and August.  
**SOUTHERN AND SOUTHWESTERN RY. CLUB.**—A. J. Merrill, 218 Prudential Bldg., Atlanta, Ga.; 3d Thurs. in Jan., April, Aug. and Nov.  
**TRAVELING ENGINEERS' ASSOCIATION.**—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.  
**WESTERN RAILWAY CLUB.**—J. W. Taylor, 390 Old Colony Bldg., Chicago, Ill.; 3d Tuesday each month, except June, July and Aug.  
**WESTERN SOCIETY OF ENGINEERS.**—J. H. Warder, Monadnock Building, Chicago; first Wednesday, except July and August.

**Traffic News.**

The Federal Court at Little Rock has issued an injunction restraining the Railroad Commission of Arkansas from enforcing against the Little Rock & Hot Springs Western the state 2-cent fare law and the orders of the commission reducing freight rates.

According to the *New York Journal of Commerce*, complaints regarding increases in freight rates are now coming into the office of the Interstate Commerce Commission in great volume. Many of these complaints have to do with rates on coal, meat, lumber and other staple articles.

The Railroad Commission of Louisiana has issued an order, effective on October 25, that the charge of 3 cents per sack for loading and unloading rice at points in Louisiana shall be abolished and that the carload rates already fixed by the Commission shall be applied without any additional charge.

The Manufacturers' Club of Buffalo, N. Y., jointly with the Black Rock Manufacturers' Association, now maintains a traffic bureau in the Coal & Iron Exchange. The manager, William H. Frederick, is to act, where desired, as the agent of the members of these associations in their dealings with the railroads.

The Inspection bureau of the Trunk Line Association has now been in existence 25 years, and, according to an account of its work printed in the *Brooklyn Eagle*, shippers who try to "beat" the railroads by representing goods as low class when they are high class, are as plenty as ever; or, at any rate, are so numerous that each inspector, it is estimated, saves enough on freight bills for his employers to pay his salary six times over.

Members of the Central Passenger Association are considering a plan for pooling the eastbound second class passenger traffic from Chicago and the west, that which goes on through railroad and steamship steorage tickets. While details of the plan have not yet been determined it has been practically decided that four of the differential lines, the Erie, the Grand Trunk, the Nickel Plate and the Wabash shall each receive one-sixth of the business, and the other three differential roads, the Baltimore & Ohio, the Michigan Central, and the Panhandle route will divide the other two-sixths.

The Chicago, Milwaukee & Gary, which is the new name of the railroad heretofore known as the Illinois, Iowa & Minnesota, has issued a notice that it adopts and makes its own in every respect all tariffs, rules, notices, concurrences, traffic agreements, divisions, authorities, powers of attorney and other instruments filed with the Interstate Commerce Commission or concurred in by the Illinois, Iowa & Minnesota. The Chicago, Milwaukee & Gary is an outer belt line at Chicago that connects Rockford with Moline, Ill. All former officers of the Illinois, Iowa & Minnesota became the officers of the Chicago, Milwaukee & Gary.

The railroads in Arkansas have filed freight tariffs to take the place of those made by the Railroad Commission, the enforcement of which has been enjoined by the Federal Court. The new tariffs became effective November 2. They are somewhat higher than the rates fixed by the Commission, and differ in some particulars from the rates that the railroads had in effect before the Commission issued its orders. The situation in Arkansas gave the railroads a chance to make more scientific tariffs than is usually possible, and they sought to take advantage of it. The rates were made after conferences not only with the Commission, but with shippers. However, the Commission and many shippers in the state criticize the new rates severely. The Commission on October 31 issued an order declaring the rates extortionate and unlawful, and prohibiting their collection. It also holds the rates it fixed as just, although the federal court has enjoined their enforcement. A. S. Bragg, manager of the Merchants' Traffic Bureau, Little Rock, is quoted as denouncing the new schedule as an outrage. He says: "It not only affects the wholesaler, but the retailer and every consumer. While I am in favor of high prices and high wages, I do not believe in highway robbery."

The Pennsylvania Railroad also has an educational train.

It is the "farmers' special" and will leave Broad street station, Philadelphia, Nov. 10, for a three-day trip through eastern Pennsylvania. Twenty-two stops will be made, at each of which 45-minute lectures by experts from the state College of Agriculture will be given on the growing of alfalfa, soil fertility, corn culture and dairy products. Pamphlets have been prepared for distribution at the different stations at which the train will stop. These pamphlets will contain practical suggestions to the farmer for improving both his products and soil. The purpose of the farmers' special is to make more personal and direct the efforts which the state college has been exerting to disseminate instruction to the farmers throughout the state. Appreciating the importance of this movement, the Pennsylvania agreed to run the special. The train will be made up of three day coaches and an engine. The cars will be fitted up as lecture rooms, but talks will be given outside when the capacity of the cars is exhausted. Representing the state college on the special will be Professors Agee, Hunt, Van Norman, Gardner, Shaw, and McDowell. It is probable that the United States Bureau of Forestry will send someone to talk on the preservation of fence posts and the care of trees. W. J. Rose and C. E. Kingston, division freight agents, will represent the Pennsylvania.

The Illinois Central, the Chicago & North-Western, the Wabash, the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul, the Grand Trunk, the Chicago Terminal Transfer Railroad, and the Belt Railway of Chicago have filed a petition in the United States Circuit Court at Chicago for an injunction to restrain the railroad Commission of Illinois from enforcing its order fixing a new schedule of switching rates. The rates prescribed by the Commission were given in the *Railroad Age Gazette*, September 25, page 1018. Judge Kohlsaat set November 18 as the date for the hearing and suspended enforcement of the rates meantime. The rates fixed by the Commission are attacked as unreasonable and confiscatory. The Belt Railway says they would reduce its revenues \$300,000 a year, and in view of the deficit of \$162,275 between January 1 and September 1, 1908, it is declared that this would destroy the value of the property. The North-Western, the Burlington and the St. Paul each say the Commission's rates would reduce their receipts \$100,000 annually; the Wabash estimates a reduction in revenues of \$25,000 annually, and the Santa Fe \$2,000. The Illinois Central says the reduction in switching charges on coal traffic alone would cause it a loss of \$10,000 annually, and the total loss on all kinds of traffic would be much more. J. N. Faithorn, Receiver and President of the Chicago Terminal Transfer, says this road was operated at a loss of \$45,000 in the last fiscal year, and the Commission's switching rates would greatly increase its deficit. He challenges the power of the Commission to define a territory as the Chicago switching district for the purpose of making exceptional rules as to switching. The requirement that switching charges on grain shall not exceed 75 per cent. of those on other commodities is denounced by all the complainants as an arbitrary and unreasonable discrimination.

#### INTERSTATE COMMERCE COMMISSION.

It is held essential that when one tariff cancels a part of another tariff, specific reference to the tariff so effected and to the part so canceled shall be given, and the carrier must issue the amendment.

It is held unlawful for a railroad to provide an empty car at factory sidings into which shippers may load L. C. L. shipments which are redistributed by the agent of the railroad at its regular freight station.

The commission held that a pass must be issued to a *bona fide* ex-employee who is traveling for the purpose of going to work for any common carrier, whether the work has been previously arranged for or not.

A petition to reopen the case of the *Traffic Bureau Merchants Exchange of St. Louis v. Chicago, Burlington & Quincy*, in which the commission forbid the allowance of elevation charges at the Missouri river, has been denied.

In connection with the provision of the anti-pass law which provides that free transportation must be given to families of employees killed in the service of common carriers, it was held that this does not include the families of employees who died a natural death while in the service of a common carrier.

A dealer bought a carload of lumber f.o.b. at the milling point, and through the mill owner's failure to load the car promptly, demurrage accrued but was not collected on delivery of the car. The commission held that demurrage must be collected by the railroad, but would not decide from whom the money should be collected.

Complaint has been filed with the Interstate Commerce Commission against the Delaware, Lackawanna & Western by J. M. Ballou, coal dealer, alleging that the sale of coal at wholesale through New York state is regulated by railroad companies in such manner as to prevent a reduction of prices by competition, and that the number of persons to whom coal will be supplied is restricted.

A protest has been filed with the Interstate Commerce Commission against the enforcement of the rule recently promulgated by the official classification committee requiring the consignee's name to be shown on every package of freight. The Pennsylvania and the New York, New Haven & Hartford are named in the complaint. The complaint alleges that by placing the name of the consignee on the package, competitors are enabled to learn the names of customers, to the shipper's disadvantage.

Prior to August 28, 1906, when the amended act to regulate commerce became effective, some roads used car service rules of car service associations to assess demurrage and other terminal charges. These rules were not filed with the commission until after August 28, but bore effective dates, ante-dating the amended act. The commission held that since the law required railroads to file their schedules both before and after August 28, 1906, no charge not so filed could be collected, and that therefore the tariff used before August 28 did not become effective until 30 days after they were filed with the commission.

A lawful through rate existed between two points, applicable over two routes, one of which was indirect, and therefore not ordinarily used by the railroad for through movements. The shipper billed locally to a point on the latter route, and re-billed to destination without taking either constructive or actual possession of the car at the local point, but making his re-billing arrangements with the agent of the railroad at a distant point. Upon arrival of the shipment at destination, the carrier collected the balance of the through rate and the Commission held that the local billing was not in good faith, but was a device between the shipper and the carrier's agents to avoid the higher through rate, by having the carrier's agents act as the forwarding agents of the shipper. In such a case the through rate is the only rate lawfully applicable.

Rule 52, Tariff Circular 15-A, has been amended by adding the following: When it becomes necessary to change the terms of a short-time excursion fare tariff issued under this rule and covering a period not exceeding 30 days, for any of the following reasons: Changes in dates of meeting, involving changes in dates of sale and in return limit, not exceeding 30 days; extension of the return limit, not exceeding 30 days; additional selling dates; additional stop-over privileges; or a reduction in fares, or to cancel such tariff before date of its expiration, when the occasion for the excursion has been declared off, such change or cancellation may, when the excursion is limited to a designated period of not more than three days, be made by posting tariff containing the cancellation or change one day in advance in two public places, in the waiting room of each station where tickets for such excursion are sold, and mailing a copy thereof to the Commission. If the excursion is limited to a designated period of more than three days and not more than 30 days, cancellation or change may be made on like notice of three days. If the excursion is limited to a designated period exceeding 30 days, statutory notice must be given of change or cancellation, or special permission for shorter time must be secured.



## STATE COMMISSIONS.

The Railroad Commission of Louisiana has ordered that all railroads carrying baggage or commercial samples on passenger trains shall allow 48 hours free storage of such baggage or commercial samples after their destination is reached.

The Railroad Commission of Louisiana has ordered the Louisiana Western, the Crowley Belt & Terminal and the Opelousas, Gulf & Northeastern to establish interchange track connections at Crowley, La., the expense to be divided between the lines.

The Railroad Commission of Louisiana has ordered the railroads in the state to furnish enamel drinking cups or glasses at water coolers in both passenger coaches and station waiting rooms. The Commission has found that the drinking cups furnished by the roads are frequently "unfit for use."

The Oklahoma State Railroad Commission now has an engineer, J. M. Lee, formerly Superintendent of the Houston & Texas Central at Houston; of the Southern Pacific at San Antonio, and of the Trinity & Brazos Valley. His first work, it is said, will be to make a valuation of all the railroads in the state.

The New York Public Service Commission, First district, has ordered the Metropolitan Street Railway and the Fifty-ninth street cross-town line of the Central Park, North & East River to interchange transfers. The Metropolitan is to get 3¾ cents and the Central Park company 1¼ cents of each 5 cent fare.

The New York Central & Hudson River has been ordered by the New York Public Service Commission, Second district, to reduce its weighing charges from 50 cents a car to 25 cents a car on the cars of the Buffalo Foundry & Machine Co. The weighing is done on track scales belonging to the Buffalo Foundry & Machine Co.

The Crowley Board of Trade has petitioned the railroad commission of Louisiana to have Crowley put on the same basis as New Orleans in the matter of rates on clean rice. The rates asked are on a mileage basis starting with a rate of 5.5 cents per 100 lbs. for 10 miles and under, and going up to 12 cents per 100 lbs. for over 125 miles.

The Board of Railroad Commissioners of California, in the case of *Bridgeford-Cunningham Co. v. McCloud River Railroad*, states emphatically that it is not governed by rules of evidence as observed by the courts of law, its object being to arrive at the facts, and that in so doing it follows the practice adopted by the Interstate Commerce Commission.

The Railroad Commission of Louisiana having reduced the rate on coal, c.l., from New Orleans to Opelousas during the summer months, upon the petition of the Crowley Board of Trade orders the Morgan's Louisiana & Texas and the Louisiana Western to reduce the rate from New Orleans to Crowley to \$1.10, being the same rate that is in effect to Opelousas. Crowley is about the same distance from New Orleans as is Opelousas.

The Railroad Commission of Louisiana has refused to order the Yazoo & Mississippi Valley to increase its passenger service on the Baton Rouge & Hammond branch. Complaint was made that the service was inadequate. The Commission says it inspected the line and found its physical condition excellent. There is now a mixed freight and passenger train each way daily. The road began operation in February, 1908, and the Commission finds that up to July 31, 1908, the total earnings of the line were \$19,604, while its operating expenses were \$29,782. It is therefore concluded that the road is furnishing the best service that it is justified in giving.

The Railroad Commission of Louisiana has ordered the Texas & Pacific to build within 90 days a granite roadway at its New Orleans freight terminals to extend along what is known as the Brogan shed, the full length of its yard from Thalia to Terpsichore streets, and also to build a granite roadway along what is known as the Harris shed, these roadways to be not less than 30 ft. wide. It has also ordered this road to build a covered platform along each side of the center track of its yard within six months. These orders are made

to provide better means for the handling and storing of sugar and molasses. The yards were in wet weather very muddy.

The Railroad Commission of Louisiana, although upholding the principle underlying concentration charges on cotton, that is, a certain fixed charge to be collected from the shipper and returned to him when the cotton is returned to the railroad company for re-shipment, held that concentration charges were not proper at a town through which no other railroad runs, and where the concentrated cotton must be shipped out over the same railroad by which it was brought in. The same ruling was made in the case of products of cotton seed.

## A Wisconsin Telephone Law.

The Railroad Commission of Wisconsin has rendered an opinion requiring the Great Northern to install a telephone of the People's Telephone Company in its ticket office at Superior, Wis. The road already had the service of the Douglas County Telephone Company, with which it had a contract providing that it would use the services of this company exclusively. The Commission held that the carrier may not select exclusively any telephone agency which for any reason is incapable of enabling the carrier fully to discharge its duties to the public. The Commission said of the law under which it acted:

"To compel a railroad to install telephone service in all instances where none at present exist and where they may not be essential, would by an unreasonable requirement and yet the act commands that when the Commission, ascertaining upon investigation, that no telephone service can be had with any road, it shall by order fix [prescribe] a reasonable service to be installed. It must follow from the mandatory language employed that the Commission has no discretion to refuse to grant an order requiring such service to be provided. That such a regulation is not reasonable must be apparent to all. Nevertheless, it is the business of the judiciary and not of this Commission to declare whether any statute, under the police power, is reasonable and valid or unreasonable and void. Until the Supreme Court holds invalid a statute, enforcing duties upon the commission, its provisions must be observed and enforced."

## Steamship Business in a Bad Year.

The *Journal of Commerce* quotes the following figures for the transatlantic traffic at the port of New York during the first 10 months of 1907 and 1908:

	Cabin passengers					
	1908.	1907.	Dec.	1908.	1907.	Dec.
Westbound ....	83,568	92,152	8,583	142,890	196,434	53,544
Eastbound ...	85,122	90,762	5,640	94,819	92,467	*2,352
Total .....	168,690	182,914	14,223	237,709	288,901	51,192
Steerage: Westbound .....				330,455	1,186,784	856,329
Eastbound .....				582,106	349,395	*232,711
Total .....				912,561	1,536,179	623,618

\*Increase.

On the basis of \$100, which, it is believed, is a very low average rate for first cabin, \$45, which is equally low for the average second cabin and \$25 for steerage, the steamship lines for the first 10 months of 1908 are confronted by a deficit of \$19,316,390 from the 1907 figures as follows:

First cabin—14,223 passengers at \$100.....	\$1,422,300
Second cabin—51,192 passengers at \$45.....	2,303,640
Steerage—623,618 passengers at \$25 .....	15,590,450
Total deficit.....	\$19,316,390

These figures cover Canadian as well as United States Atlantic port business. The figures by months show that the greatest outward movement took place in April, which is usually one of the most active months for inward travel. The monthly record follows:

	Emigration			Immigration		
	1908.	1907.	Change.	1908.	1907.	Change.
January .....	58,767	16,272	+ 12,495	27,220	54,417	— 27,197
February .....	50,394	16,119	+ 34,265	23,381	65,541	— 42,100
March .....	46,311	20,092	+ 26,219	32,517	139,118	—106,601
April .....	87,561	27,944	+ 59,617	41,274	145,256	—103,982
May .....	75,345	33,710	+ 41,635	36,317	183,526	—147,209
June .....	59,296	41,655	+ 17,641	20,073	136,843	—116,770
July .....	64,468	52,426	+ 12,042	29,518	134,501	—104,983
August .....	63,642	50,050	+ 13,592	41,938	121,087	— 79,149
September .....	40,188	43,028	— 2,840	38,502	101,862	— 63,365
October .....	36,144	48,099	— 11,955	39,715	104,628	— 64,913
Total, 10 mos. 582,106 349,395 + 232,711				330,455 1,186,784 — 856,329		
Excess .....	232,711			837,389		

# REVENUES AND EXPENSES OF RAILROADS.

MONTH OF SEPTEMBER, 1908.

Mileage* operated at end of period.	Name of road.	Operating revenues.				Operating expenses.				Net operating revenues (or deficit).	Outside operations.	Taxes.	Operating (or dec.) income last year.	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Inc. misc.	Total.	Way and structures, equipment.	Maintenance of traffic.	Trans- portation.	General.					
4,406	Atlantic Coast Line	\$1,362,571	\$497,531	\$1,902,600	\$2,854,338	\$322,507	\$33,662	\$631,011	\$56,192	\$1,328,711	\$573,889	\$90,000	\$488,889	\$137,530
515	Bangor & Aroostook	214,387	59,115	282,475	105,731	29,715	2,557	76,519	10,808	159,477	112,799	1,500	120,381	28,785
568	Buffalo, Rochester & Pittsburgh	510,899	87,111	626,938	115,717	144,833	9,128	183,011	27,858	485,651	161,348	1,331	146,215	124,609
1,916	Central of Georgia	709,215	224,607	1,004,361	1,004,361	173,977	25,683	308,917	37,118	683,651	313,956	36,300	313,056	66,402
966	Central of Illinois	685,156	157,238	837,394	109,169	177,742	14,702	288,650	33,058	623,351	268,010	1,823	238,687	113,498
7,632	Chicago & Eastern Illinois	4,418,784	1,663,594	6,387,877	773,329	677,977	96,264	2,123,116	187,909	4,290,228	2,739,789	230,000	2,556,087	339,572
9,023	Chicago & North Western	4,838,573	1,966,588	7,492,325	1,136,597	1,074,441	137,353	2,012,927	158,909	4,340,228	2,829,155	212,600	2,615,251	197,362
580	Chicago, Burlington & Quincy	317,763	173,763	491,526	28,764	177,276	1,040	106,949	3,351	708,152	490,749	3,000	120,255	133,662
1,730	Chicago, Lake Shore & Eastern	801,141	473,599	1,274,740	192,507	182,017	21,036	423,574	23,938	1,050,757	429,816	21,070	438,178	80,452
1,250	Chicago, St. Paul, Minn. & Omaha	509,049	173,190	682,239	98,804	124,848	20,659	206,959	26,959	470,536	249,164	11,800	238,164	122,781
893	Colorado & Southern	1,977,912	424,307	2,402,219	350,685	350,407	42,691	732,689	11,091	1,597,575	1,255,857	112,800	1,157,862	2,782
867	Delaware, Lackawanna & Western	413,683	69,209	482,892	278,432	350,685	350,407	732,689	11,091	1,597,575	1,255,857	112,800	1,157,862	2,782
1,902	El Paso & Southwestern	2,722,004	1,000,964	3,722,968	60,194	771,202	76,147	1,222,692	11,361	2,955,596	1,699,043	43,822	2,516,554	439,042
382	Grand Rapids & Indiana	4,493,185	183,779	4,676,964	43,598	575,572	9,931	1,506,862	13,311	3,162,851	1,680,000	33,022	2,582,851	680,000
6,672	Great Northern	860,587	1,000,656	1,861,243	1,029,685	575,572	9,931	1,506,862	13,311	3,162,851	1,680,000	33,022	2,582,851	680,000
1,518	Gulf, Colorado & Santa Fe	503,845	110,051	613,896	178,998	191,047	15,396	368,861	35,448	433,770	245,741	15,499	28,330	114,016
1,827	Kansas City Southern	2,434,126	405,925	2,840,051	294,853	579,597	67,995	826,109	16,793	338,931	223,612	12,713	310,046	107,039
1,446	Lehigh Valley	2,244,534	507,149	2,751,683	98,703	95,163	15,229	313,043	16,793	338,931	223,612	12,713	310,046	107,039
3,361	Long Island	2,808,921	926,157	3,735,078	424,420	666,090	25,936	264,946	28,514	3,456,347	2,655,891	16,100	241,599	15,446
926	Louisville & Nashville	568,928	100,964	669,892	87,814	109,000	9,345	249,283	14,563	476,347	239,619	9,751	223,227	15,446
546	Mobile & Ohio	531,156	159,407	690,563	88,215	115,121	9,345	249,283	14,563	476,347	239,619	9,751	223,227	15,446
1,920	New York, Ontario & Western	2,072,409	345,051	2,417,460	290,155	421,914	38,558	688,922	53,136	1,404,685	1,011,114	2,081	87,600	150,016
473	Norfolk & Western	781,173	188,749	969,922	86,811	171,856	11,850	429,194	21,943	771,358	302,282	1,174	19,515	283,941
5,649	Norfolk Southern	4,668,278	1,763,804	6,432,082	742,758	660,879	68,367	1,714,444	80,930	3,267,378	3,533,583	63,072	3,324,618	765,694
1,414	Northern Pacific	2,809,572	631,091	3,440,663	295,155	61,265	57,639	1,100,254	72,443	2,136,758	1,601,507	1,441	1,465,946	121,180
4,163	Pennsylvania Railroad Co.	8,380,470	1,742,775	10,123,245	1,472,775	2,245,905	141,065	4,011,128	322,219	5,138,152	3,546,979	96,167	174,339	107,998
714	Pennsylvania Railroad Co.	688,523	592,597	1,281,120	191,749	255,718	55,718	893,236	33,204	938,152	395,389	4,061	362,244	5,258
1,472	Philadelphia, Balt. & Washington	2,014,914	404,404	2,419,318	1,472,775	2,245,905	141,065	4,011,128	322,219	5,138,152	3,546,979	96,167	174,339	107,998
7,294	Pittsburgh, Cln. & St. Louis	2,916,459	701,419	3,617,878	130,995	126,856	21,249	1,495,268	16,294	3,163,708	1,541,144	161,615	1,618,589	237,581
829	Southern	488,362	329,584	817,946	68,177	116,681	10,733	183,738	13,518	376,369	136,555	22,088	14,978	114,978
442	West Jersey & Seashore	124,431	47,666	172,097	16,681	44,746	24,359	214,957	21,810	413,269	287,237	401	258,547	35,758
1,023	Wheeling & Lake Erie	420,344	46,623	466,967	75,632	75,632	24,359	214,957	21,810	413,269	287,237	401	258,547	35,758
1,023	Wisconsin Central	508,980	154,276	663,256	76,511	75,632	24,359	214,957	21,810	413,269	287,237	401	258,547	35,758

† Loss. ‡ Decrease.

THREE MONTHS OF FISCAL YEAR.

THREE MONTHS OF FISCAL YEAR.														
4,406	\$3,560,262	\$1,275,998	\$5,220,512	\$857,423	\$775,982	\$95,806	\$1,924,491	\$172,864	\$3,926,566	\$1,293,946	\$270,000	\$1,023,946	\$147,550	
515	452,845	170,598	659,162	134,327	79,803	8,216	201,025	29,350	1,127,791	216,441	4,500	241,367	1,686	
568	1,523,886	276,416	1,897,032	300,358	468,215	76,838	540,375	39,350	1,371,466	520,963	45,000	477,341	130,435	
1,916	1,756,092	783,177	2,539,269	371,775	439,072	77,658	892,332	111,012	1,479,070	720,000	15,747	682,208	236,173	
966	1,911,454	466,078	2,377,532	311,775	439,072	44,459	848,958	274,188	1,749,922	770,362	83,680	1,133,682	354,172	
7,632	4,888,024	1,753,656	6,641,680	314,097	1,860,384	285,218	5,871,814	202,830	10,674,962	6,849,474	690,000	6,184,388	186,587	
9,023	13,040,991	5,840,616	20,539,145	2,382,578	2,520,289	494,548	5,884,249	174,188	13,192,828	7,346,178	637,800	6,705,480	197,198	
580	950,898	1,117,476	3,350,970	3,321,328	3,179,767	403,075	5,884,249	494,548	13,192,828	7,346,178	9,000	359,227	118,141	
1,730	2,040,601	1,117,476	3,350,970	583,593	359,224	64,570	1,163,643	77,250	2,908,075	1,724,895	158,908	1,020,026	27,865	
1,250	1,458,677	544,406	2,003,083	934,368	346,092	44,265	1,163,643	77,250	2,908,075	1,724,895	338,400	3,260,858	1,021,096	
867	5,802,150	1,948,713	7,750,863	1,093,588	1,066,404	144,386	2,227,350	147,426	4,075,184	3,850,108	338,400	3,260,858	1,021,096	
1,902	7,256,178	2,367,738	9,623,916	2,110,858	2,414,030	221,804	4,111,922	161,574	4,075,184	3,850,108	338,400	3,260,858	1,021,096	
382	611,920	3,237,123	14,724,741	1,312,640	2,141,386	221,292	3,522,354	225,054	1,381,012	615,254	270,622	401,435	372,259	
6,672	10,741,517	731,988	3,082,573	1,294,874	154,015	30,137	438,524	39,737	1,792,287	462,935	1,382	539,630	1,316,743	
1,518	2,186,978	731,988	3,082,573	439,801	520,761	53,309	1,050,870	250,531	918,759	5,856,617	106,053	539,630	1,316,743	
1,827	1,592,948	346,394	2,214,342	869,597	252,916	64,261	675,661	101,534	1,255,956	826,649	256,800	1,057,873	237,581	
7,294	2,916,459	701,419	3,617,878	1,309,995	126,856	21,249	1,495,268	16,294	3,163,708	1,541,144	65,141	2,067,948	171,048	
829	488,362	329,584	817,946	68,177	116,681	10,733	183,738	13,518	376,369	136,555	337,012	3,846,344	471,963	
442	124,431	47,666	172,097	16,681	44,746	24,359	214,957	21,810	413,269	287,237	48,300	623,423	175,023	
1,023	508,980	154,276	663,256	76,511	75,632	24,359	214,957	21,810	413,269	287,237	46,250	896,972	353,450	
											262,800	2,731,632	434,050	
											1,520	2,731,632	434,050	
											2,649	785,041	113,536	
											151,513	732,686	8,130,142	
											388,610	4,352,612	179,069	
											6,232,469	4,352,612	179,069	
											330,018	10,832,978	2,731,632	
											83,425	1,095,606	132,765	
											3,096	3,892,473	332,692	
											320,625	2,955,473	132,765	
											484,733	3,761,121	369,632	
											26,658	75,848	536,881	
											45,572	51,337	402,007	
											1,891	681,681	417,432	
											87,266	711,734	258,405	



**Argument in Missouri River Jobbers' Case.**

The United States Circuit Court at Chicago, Judges Grosscup, Seaman and Baker, heard arguments on October 30, in the case brought by 11 roads operating between the Mississippi and Missouri rivers, to have the Interstate Commerce Commission enjoined from enforcing its order in the Missouri river jobbers' case. (Burnham, Hanna, Munger et al. v. C., R. I. & P. et al. See *Railroad Age Gazette*, September 18, p. 938, and October 23, p. 1214).

W. D. McHugh, who appeared as counsel for the railroads, attacked the order of the commission upon the ground that it would cause discrimination in favor of shippers at the Atlantic seaboard and the Missouri river as against shippers at Chicago, St. Louis and other intermediate points, and would tend to establish a wrong principle. He defended the roads in making rates break at the Mississippi river, contending that while in the case of a single road long distance transportation may cost less than local business because the heavy terminal costs are distributed over more mileage, in the case of connecting roads, it does not follow that a through joint rate should be less than the sum of the local rates. Through shipments from New York to the Missouri river must be transferred from one road to another at Chicago, St. Louis or other points of connection, and these transfers, owing to the expense of switching or reloading, are as costly as the cost of loading at a terminal. Affidavits were presented to show that through transportation through Chicago costs more than local hauls.

The Interstate Commerce Commission was represented by Luther M. Walter. Mr. Walter said the principle that the roads are attacking in this case is applied by them in the rates from New York to St. Paul. The local rate from New York to Chicago is 75 cents, first class, and from Chicago to St. Paul 60 cents, but the joint through rate from New York to St. Paul is only \$1.15. Judge Grosscup asked Mr. Walter why the Commission had not considered the effect of its order on the intermediate cities. Mr. Walter replied that it could do so only after complaint had been made by the other cities affected. He argued that as a matter of principle through rates should be less than the combinations of the locals.

**Equipment and Supplies.****LOCOMOTIVE BUILDING.**

*The Northern Pacific* is in the market for three Atlantic and 10 Pacific locomotives.

*The Virginia-Carolina* has ordered one locomotive from the Baldwin Locomotive Works.

*The Bonlee & Western*, J. H. Dunlop, Pt. Dillon, S. C., is asking prices on some locomotives.

*The Lehigh & Hudson River* has ordered six locomotives from the Baldwin Locomotive Works.

*The Western Washington Logging Co.* has ordered two locomotives from the Baldwin Locomotive Works.

*The St. Johns River Terminal Co.* has ordered one locomotive from the Baldwin Locomotive Works.

*The Pittsburgh Coal Co.*, Pittsburgh, Pa., has ordered one locomotive from the Baldwin Locomotive Works.

*The Western Maryland* has ordered 10 consolidation and three switching locomotives from the Baldwin Locomotive Works.

*The Keweenaw Central* has ordered one 10-wheel locomotive from the Baldwin Locomotive Works. It will have cylinders 19 in. x 26 in. with a tractive power of 29,000 lbs.

*The Canton-Hankow*, as reported in the *Railroad Age Gazette* of October 30, has ordered six simple mogul locomotives from

the American Locomotive Company for delivery within five months. The specifications are as follows:

General Dimensions.	
Gage .....	4 ft. 8½ in.
Weight on drivers .....	123,000 lbs.
Weight, total .....	141,000 "
Cylinders .....	19 in. x 26 in.
Diameter of drivers .....	56 "
Boiler, type .....	Extended wagon top
Boiler, working steam pressure .....	180 lbs.
Heating surface, tubes .....	1,835 sq. ft.
" " firebox .....	165 "
" " total .....	2,000 "
Tubes, number .....	290
" outside diameter .....	2 in.
" length .....	12 ft. 2 "
" material .....	Knobbed charcoal iron No. 12
Firebox, type .....	Narrow
" length .....	108 in.
" width .....	40 "
Grate area .....	30.3 sq. ft.
Water capacity .....	5,000 gals.
Coal capacity .....	9 tons

Special Equipment.	
Axles .....	Open-hearth steel
Bell ringers .....	Sansom
Boiler lagging .....	Sectional magnesla
Brakes .....	Westinghouse-American combined
Couplers .....	Janney
Driving boxes .....	Cast steel
Headlight .....	14-in. round case
Injectors .....	Nathan, Monitor No. 8
Journal bearings .....	Bronze
Piston and valve rod packing .....	Jerome
Safety valve .....	Coale encased, 3-in.
Sanding devices .....	Pneumatic
Lubricators .....	Nathan
Springs .....	Cast steel
Staying .....	Double refined iron
Tires .....	Open-hearth steel
Valve gear .....	Walschaerts
Wheel centers .....	Cast steel
Staybolts .....	A. L. Co.'s standard flexible

*The Central Northern Railway of Argentina*, as reported in the *Railroad Age Gazette* of October 30, has ordered eight simple Pacific locomotives from the American Locomotive Company for delivery in November. The specifications are as follows:

General Dimensions.	
Gage .....	39¾ in.
Weight on drivers .....	79,000 lbs.
Total weight .....	114,600 "
Cylinders .....	17 in. x 26 in.
Diameter of drivers .....	54 "
Boiler, type .....	Belpaire straight top
Boiler, working steam pressure .....	170 lbs.
Heating surface, tubes .....	1,685 sq. ft.
" " firebox .....	90 "
" " total .....	1,775 "
Tubes, number .....	208
" outside diameter .....	2 in.
" length .....	15 ft. 8¾ "
" material .....	Charcoal iron No. 12
Firebox, type .....	Semi-wide
" length .....	66¼ in.
" width .....	55¾ "
" material and maker .....	Steel; Siemens-Martin
Grate area .....	24.5 sq. ft.
Water capacity .....	4,000 gals.
Coal capacity .....	10 metric tons

Special Equipment.	
Axles .....	Siemens-Martin steel
Boiler lagging .....	Sectional magnesla
Brakes .....	Westinghouse-American combined
Couplers .....	Railroad Co.'s standard
Driving boxes .....	Cast steel
Headlight .....	16-in. round case
Injector .....	Simplex
Journal bearings .....	Bronze
Piston and valve rod packing .....	Trojan metallic
Safety valve .....	Crosby's muffled
Sanding devices .....	Leach pneumatic
Lubricators .....	Nathan
Springs .....	Siemens-Martin steel
Staying .....	Refined iron
Steam gages .....	Burdon
Tires .....	Open-hearth steel
Valve gear .....	Stephenson
Wheel centers .....	Siemens-Martin cast steel

**CAR BUILDING.**

*The Chicago Great Western* is asking prices for repairing 2,500 freight cars.

*The Peabody Coal Co.*, Chicago, is in the market for 300 fifty-ton steel coal cars.

*The Bonlee & Western*, J. H. Dunlop, Pt. Dillon, S. C., is asking prices on passenger cars.

*The St. Louis Southwestern* is making inquiries on a number of passenger cars, reported to be about 30.

*The Erie* has ordered from the Ralston Steel Car Co. 1,000 steel underframes for use in repair work.

*The Detroit, Toledo & Ironton* intends to contract for repairing a number of miscellaneous freight cars.

*The Cincinnati, Hamilton & Dayton* intends to contract for repairing a number of miscellaneous freight cars.

*The New York, New Haven & Hartford* has ordered 100 passenger cars from Osgood, Bradley & Sons for 1909 delivery.

*The Missouri Pacific* has given a contract to the Sheffield Car & Equipment Co., Kansas City, Mo., for repairing 500 box cars.

*The Atchison, Topeka & Santa Fe* has given a contract to the Sheffield Car & Equipment Co., Kansas City, Mo., for repairing 475 refrigerator cars.

*The St. Paul & Des Moines* has ordered 125 forty-ton box cars, 50 fifty-ton steel drop bottom coal cars and four cabooses from the American Car & Foundry Co.

*The Georgia & Florida* has ordered 200 flat cars and 150 box cars from the Hicks Locomotive & Car Works. Mention of these cars was made in the *Railroad Age Gazette* of October 30.

*The Northern Pacific* is asking prices for 300 Hart convertible cars and 63 passenger cars of miscellaneous types. It is said that this road will be in the market about January 1 for from 1,000 to 5,000 freight cars of various types, but this latter is not yet confirmed.

*The Louisville & Nashville*, reported in the *Railroad Age Gazette* of October 30 as about to build 500 coal cars in its own shops, has just begun building 350 gondola cars at its South Louisville shops. These cars were authorized and the material purchased before the business depression.

*The Washington Water Power Co.*, Spokane, Wash., reported in the *Railroad Age Gazette* of October 9 as asking prices on 20 city and seven closed interurban cars, has ordered this equipment from the J. G. Brill Co., for March delivery. Five of the interurban cars are to be trailers.

*The Georgia & Florida* has ordered four 54-ft. first-class passenger cars, one 54-ft. passenger and baggage, and one combination passenger, baggage and mail car from the Hicks Locomotive & Car Works. The combination car will be 60 ft. long, inside measurements, and 64 ft. long over all. The bodies of these cars will be wood. The special equipment includes:

Brakes .....	Westinghouse
Brake-beams .....	Metal
Couplers .....	Tower
Heating system .....	Safety Car Heating & Lighting Co.
Lighting system .....	Oil lamps
Paint .....	Pullman color
Platforms .....	Steel
Seat covering .....	Plush

#### IRON AND STEEL.

*The Rock Island Southern (Electric)* will require about 6,000 tons of steel for a bridge across the Edwards river near Preemption, Ill. (See Preemption, Ill., under Railroad Structures.)

*The Grand Trunk*, reported in the *Railroad Age Gazette* of August 28 as being in the market for 1,000 tons of steel for bridge construction, is said to have ordered 220 tons from the American Bridge Company.

*The Cincinnati Southern* has given the contract for 4,000 tons of steel for the Eighth street viaduct at Cincinnati, Ohio, to the Riter-Conley Manufacturing Co. (See Cincinnati, Ohio, under Railroad Structures.)

#### RAILROAD STRUCTURES.

BALTIMORE, MD.—An officer writes that tentative plans have been prepared for a new passenger station at Baltimore, to be occupied jointly by the Philadelphia, Baltimore & Washington and the Northern Central Railway, who occupy this station at the present time. The station proper will be approximately

100 ft. wide and 300 ft. long. The train floor, or the floor on a level with the tracks, will be occupied by baggage, express, emigrant station, train master, etc. The floor some 25 ft. above the level of the tracks will have various waiting rooms, ticket offices, telephone and telegraph offices, etc., and the upper floors will be occupied by the offices of the Superintendent and General Agent and their staff of employees. The approximate cost, as planned, is about \$1,000,000. The material will be brick with terra-cotta finish. Nothing whatever will be done until the plans are approved in a general way by the city officials. It is hardly likely that any work will be done for a year.

CHARLESTON, W. VA.—The bridge of the Kanawha Bridge & Terminal Company across the Kanawha river, now building, will be 640 ft. long and 75 ft. above low water. The structure is 40 ft. wide, with a 20-ft. roadway, a walkway and space for trolley and railroad tracks. The bridge will, it is said, cost about \$500,000.

CINCINNATI, OHIO.—The Cincinnati Southern has given the contract for 4,000 tons of structural steel for the Eighth street viaduct to the Riter-Conley Manufacturing Co., Pittsburgh, Pa. The contract price was \$165,244. The viaduct is to be finished by April 15, 1909. (Oct. 9, p. 1114.)

GALVESTON, TEXAS.—Judge Terry, representing the Santa Fe, recently submitted a contract for the construction of the causeway over Galveston bay, and it is said the conditions were agreed upon by the interested parties. County Judge Mann is quoted as saying the causeway contract is satisfactory to both the county officials and the railroad with the exception of one or two minor details which were to be agreed upon November 2. Judge Terry is quoted as saying that there was no intention to delay matters, and that everything possible would be done to facilitate building the causeway.

JOPLIN, MO.—A franchise has been drafted and agreed upon by the town authorities, and all the interested railroads for the proposed new union passenger station here. The Union Depot Company has bought 17 acres of land for terminal purposes, representing an outlay to date of about \$250,000 for the proposed terminals. (July 17, p. 549.)

MELVILLE, LA.—The Railroad Commission of Louisiana has ordered the Texas & Pacific to build a new passenger and freight depot here. The structure is to be completed by January 15.

MOUNDS, ILL.—The Illinois Central has awarded the contract for building a warehouse to the George B. Swift Co., Chicago. It will be of steel and brick construction, one-story high, 98 ft. x 150 ft., and will cost \$30,000.

NEENAH, WIS.—The Chicago & North-Western has given the contract for building a new passenger and freight depot to the Charles W. Gindele Co., Chicago. It will be a two-story structure of pressed brick and stone construction and will cost \$75,000. (Oct. 30, p. 1267.)

NEW ORLEANS, LA.—Two warehouses and ten freight cars belonging to the Illinois Central were destroyed by fire on October 28. The loss is estimated at \$75,000.

OIL CITY, LA.—The plans and specifications for a combined passenger and freight station filed by the Kansas City Southern with the Railroad Commission of Louisiana have been approved. The Commission has instructed the Kansas City Southern to proceed with the construction of the depot without unreasonable delay.

PREEMPTION, ILL.—The Rock Island Southern (Electric), which is building a new electric line from Rock Island, Ill., southeast to Galesburg, will build a steel bridge across the Edwards river, near Preemption, to cost about \$180,000. The bridge will be 3,100 ft. long, with approaches 1,800 ft. long, and will require about 6,000 tons of steel.

PUEBLO, COLO.—Officers of the Colorado & Southern and the Denver & Rio Grande say that there is no truth in the newspaper reports that these roads will put up joint repair shops at Pueblo.

SALT LAKE CITY, UTAH.—The Utah Light & Power Railway Co. has been granted a permit to put up car barns 250 ft. x



430 ft., of brick and steel construction. The proposed building is to occupy the south half of the block between Fifth and Sixth south, and Sixth and Seventh east streets, the north half being used for office buildings and a power house. Cost of the improvement will be about \$142,000.

### SIGNALING.

The Cleveland, Akron & Columbus is installing an electric interlocking plant at the Union Station, Market street, Akron, Ohio, at a cost of about \$75,000. This work is done in connection with the new highway bridge over the Union Station tracks. The electric apparatus is being put in by the Union Switch & Signal Company.

### SUPPLY TRADE NOTES.

The Panama Railroad, 24 State street, New York, is asking bids up to November 9 on miscellaneous plumbing supplies.

The Johnson Wrecking Frog Co., Cleveland, Ohio, says that its business has recovered 50 per cent. during the last few months.

The Parkesburg Iron Co., Parkesburg, Pa., will be turning out charcoal iron tubes in its new mill by the middle of November.

George B. Massey has been appointed Resident Engineer of the Bucyrus Company, South Milwaukee, Wis., with offices at 50 Church street, New York.

The Joliet Railway Supply Co. has been incorporated with \$50,000 capital by C. W. Brown, Frederick A. Jackson and Fred Bennitt, all of Joliet, Ill.

The Railroad Track Gage Co. has been incorporated in Canada by J. Demarais, L. Demers, A. Lavallee, R. Delfausse and J. Laurent, all of Montreal. The capital stock of the company is \$100,000.

The Cleveland Railway Supply Co., Cleveland, Ohio, has been incorporated with \$30,000 capital stock by W. S. Newhall, Robert M. Morgan, Charles S. Beardsley, Frank H. Forest and O. G. Armstrong.

C. B. Duffy, Purchasing Agent of the Hocking Valley, says that his requisitions for October were larger than in any month of the 18 years that he has held this office. They amounted to about \$400,000.

The Third Avenue Railroad, New York, is installing in its 65th street shop a 50-ton box crane, eight 4,000-lb. air hoists, one Niles tire lathe, one 300-ton Niles wheel press and one Niles 36-in. boring mill.

The Evens & Howard Fire Brick Co., St. Louis, Mo., has enlarged its works and new plant and is now prepared to furnish gas retorts and complete gas benches, these being new departures for this company.

The fifth annual convention of the National Association of Cement Users will be held at Cleveland, Ohio, during the week of January 11-16, 1909. The Secretary is George C. Wright, Harrison building, Philadelphia, Pa.

A. C. Moore, who has been representing the Safety Car Heating & Lighting Co., New York, as General Agent in the East, has been appointed Manager of the Northwestern district, with office in the Monadnock block, Chicago.

The Marshall Car Wheel & Foundry Co., Marshall, Tex., has awarded the contract for the construction of an addition to its plant to J. C. Beason, of Marshall. The structure will be of brick and steel and will have dimensions of 30 ft. x 70 ft.

The John Davis Co., Chicago, Ill., says that it is receiving more orders at present than it has during any period of the past year. The number of orders for specialties handled by the company indicate that railroads are doing a good deal of building.

An international competition for automatic couplers has been organized at Milan, Italy, the competition to close Decem-

ber 31, 1908. The National College of Italian Railway Engineers, 25 Rue San Giovanni sul Muro, Milan, is interested in the competition.

Hugh A. Brown has resigned from the Crocker-Wheeler Company, Ampere, N. J., to whose Chicago office he has been attached for several years. He becomes Sales Manager for the Rockaway Coaster Co., Cincinnati, Ohio, in which he has a substantial interest.

Williams, White & Co., Moline, Ill., have established an office at 808 House building, Pittsburgh, Pa., in charge of Frank Ryman. Mr. Ryman was formerly connected with the Oliver Iron & Steel Co. and has had many years experience in the forging machine business.

The Ritter Folding Door Co., Cincinnati, Ohio, has the contract for the erection of Ritter folding doors in the new freight depot of the Baltimore & Ohio at Gary, Ind. P. Farrell, contractor, Cincinnati. The doors in this building are 16 ft. wide and 8 ft. high.

During the past year the Joseph Dixon Crucible Co. has completed three extensions to its several factory buildings in Jersey City, N. J. This work was planned before the business depression and completed, while business was slack, in anticipation of the revival of business.

The Philadelphia office of the Ridgway Dynamo & Engine Co., Ridgway, Pa., has been moved from the Girard building to 1017 Witherspoon building, and put under the management of Robert S. Beecher. The company is now making additional lines of side crank engines.

Gulick-Henderson & Co., Pittsburgh, Pa., have the contract for inspecting the six Canton-Hankow locomotives which, as noted in another column, have been ordered from the American Locomotive Co. The firm says that prospective orders for freight equipment are encouraging.

The Lufkin Rule Co., Saginaw, Mich., whose business is done almost entirely through supply houses, says that business is increasing greatly. Railroads are now buying, and have been for the last two months, many more measuring tapes than for a year previous, and the outlook is very promising.

The Isthmian Canal Commission (circular No. 476) is asking bids up to November 23 on galvanized iron cable, cast iron car wheels, malleable iron castings for cars, boiler grates, drills, belt hooks and lacing, vitrified pipe, and electrical supplies, including fittings, copper cable and transformers.

The General Railway Supply Co., Chicago, has received contracts for its National steel trap doors for 15 cars for the Central of Georgia to be built by the Pullman Co. and for four cars for the Colorado & Southern to be built by the Pullman Co. The Colorado & Southern cars will be fitted with Garland ventilators.

The Middletown Car Works, Middletown, Pa., says it has received more inquiries during the last two weeks than for several months past. Some South American countries are considering legislation appropriating large amounts for new construction and equipment, but this business will not become active for some two months.

The William J. Oliver Manufacturing Co., Knoxville, Tenn., has just finished twenty 12-yard dump cars for the Nevada Consolidated Copper Co., Ely, Nevada, and is beginning work on 50 all-steel double-truck six-yard cars for the Panama Canal. It has made a bid on 200 all-steel 12-yard cars for which the government recently asked bids, but this matter has not been closed.

The National Paint Works, Williamsport, Pa., says that during the last four weeks railroad orders have been made more freely than for the last 14 months. A number of large systems which had ordered almost no paint for over a year are now ordering. The National Paint Works has just shipped C. & O. standard silver gray paint for the bridge over the Kanawha river at Charleston, W. Va., being constructed by the American Bridge Co. for the Kanawha Bridge & Terminal Co.

The Frost-Trigg Lumber Co., St. Louis, Mo., was recently merged into the Frost-Johnson Lumber Co., St. Louis, having a paid-up capital of \$10,000,000. There are no changes in the personnel. This company is a heavy manufacturer of yellow pine car siding, lining, roofing, etc., and conduct a special department for the railroad trade, with headquarters at the St. Louis office.

The Kellogg Car & Equipment Co., Kankakee, Ill., which has been building a plant for the repair of freight and passenger cars, says that the plant is now in full operation. A recent contract for repair work includes 100 cars for the New York Central Lines. The company has at present about 60 car builders in its employment and this force is being increased as needed.

The Patent Financing & Manufacturing Co., Tacoma, Wash., has been incorporated with a capital stock of \$1,000,000 by E. W. W. Topliff, Dr. H. J. Hards, Albert C. Carpenter, J. B. Anderson and others. The object is to assist local inventors in manufacturing and marketing their inventions. Among the first products to be handled by this organization are a new anchor spike, a car door device and a rail punch.

The Galena-Signal Oil Co., Franklin, Pa., says that orders have been increasing, particularly in foreign business, the latter so much so that it has become necessary to build a plant at New York to facilitate foreign shipments. The street railway trade has also increased, especially in New England, and during the year a plant was erected at Boston, Mass., to take care of this and other business in that territory.

A. H. Sisson, General Manager of the St. Louis Car Co., St. Louis, Mo., has resigned, effective November 15, to become General Manager of Forsyth Brothers Co., Chicago. Mr. Sisson has been General Manager of the St. Louis Car Co. for three years, and before that was General Manager of the Jewett Car Co., Newark, Ohio. He has been active in the manufacture of both steam and electric cars for over 12 years.

The Franklin Manufacturing Co., Franklin, Pa., has a contract for reinforced corrugated asbestos roofing and sheathing for the new piers and grain elevator to be built by the Boston & Albany at East Boston, Mass., to replace the structures destroyed by fire some months ago. It also has the contract for roofing, with the same material, 11 train sheds on the Harlem River branch of the New York, New Haven & Hartford.

The Brownsville Water Co., Brownsville, Pa., has recently installed a five-ton 40-ft. traveling crane made by the Northern Engineering Works, Detroit, Mich., to be used in erecting and overhauling the pumping machinery. The Pittsburgh-Buffalo Co. has also installed a similar crane of 10 tons capacity, of Northern make, and the Worcester Salt Co. has installed a one-ton, three-motor electric crane for handling ashes.

Warren L. Boyer, formerly with the Peckham Truck Co., and later with the New York Car & Truck Company at Kingston, N. Y., has gone to the American Brake Shoe & Foundry Co., Mahwah, N. J., as Assistant in the engineering department. His duties will be to look after the standardization of brake heads and brake shoes on the lines of the standards of the American Street & Interurban Railway Association.

The September orders of the Safety Car Heating & Lighting Co., New York, exceeded the total business done during both July and August, the increase coming largely from the eastern part of the country. The 94 plants of the Pintsch Compressing Co., a subsidiary, are operating at 90 per cent. of their capacity. The assembling warehouse at Jersey City, N. J., for new equipment, is working at about 50 per cent. of the normal output.

The annual meeting of the stockholders of The Rail Joint Co., Troy, N. Y., was held at the office of the company on October 28. Directors were chosen as follows: George G. Frelinghuysen, Frederick T. Fearey, E. Y. Weber, C. P. Wheeler, Mark T. Cox, Marcus L. Ward, F. C. Runyon, L. F. Braine, Percy Holbrook, Benjamin Y. Wolhaupter and George A. Weber. The directors subsequently organized with these

officers: Chairman of the Board, George G. Frelinghuysen; President, Frederick T. Fearey; Vice-Presidents, L. F. Braine and Percy Holbrook; Secretary, Benjamin Y. Wolhaupter; Treasurer, F. C. Runyon.

The Carnegie Steel Co., Pittsburgh, Pa., recently installed on the Union Railroad (Pittsburgh) 4,000 non-insulated steel ties and 1,000 insulated steel ties, both equipped with a new special wedge fastening. This fastening consists of a tie plate, the shoulders of which bend inward toward the rail flange on each side, but not far enough to grip the flange. Between these shoulders and the flange, wedges taking the place of the usual clips are driven longitudinally so as to grip the rail, and are then locked in position.

Alfred Augustus Raymond, inventor of the Raymond concrete pile and Vice-President of the Raymond Concrete Pile Co., Chicago, who recently died at Regina, Canada, was born in Lockport, N. Y., on December 17, 1848. In 1888 he was engaged with his brother at Omaha, Neb., in the bridge building and contracting business, and in 1898 he invented the concrete pile which bears his name. To introduce his invention he moved to Chicago in 1900, and in June, 1901, he did the first actual work to prove the claims made for the pile.

At a meeting of the Board of Directors of the Western Electric Co., Chicago, on October 30, H. B. Thayer, for several years Vice-President, was elected President, succeeding E. M. Barton, who was elected Chairman of the board. H. A. Halligan and F. R. Welles were elected Vice-Presidents and W. P. Sidley, Vice-President and General Counsel. George C. Pratt was elected Secretary, succeeding Mr. Halligan. Mr. Thayer will make his headquarters in New York, and to avoid duplication between the New York and Chicago offices, a large part of the engineering work will be transferred to New York.

W. L. Reid, whose appointment as Manager of the Schenectady Works of the American Locomotive Co. has been announced in these columns, was born in



W. L. Reid

Superintendent of the Schenectady Works of the American Locomotive Co., which position he held until his appointment as Manager on October 15, 1908.

The Union Malleable Iron Co., East Moline, Ill., reports a considerable tonnage of car work, the company having a repair contract with the Rock Island Lines, who have shown great activity in the last few months, and whose orders with the company indicate that they are putting equipment into good shape. The recent orders for new cars which the Bettendorf Axle Co., Davenport, Ia., has received will also be to the advantage of the Union Malleable Iron Co. The larger part of the tonnage of the company is for agricultural implement manufacturers, who all seem to be optimistic in regard to the future, and who have placed large orders.

Among the orders booked by the American Blower Co., Detroit, Mich., between September 25 and October 20, are the following: Engines, Westinghouse Electric & Mfg. Co., for

announced in these columns, was born in 1864 at Paterson, N. J. He served his apprenticeship in the drawing office and shop of the Rogers Locomotive & Machine Works. He was made Erecting Shop Foreman, later Assistant Superintendent, and then Superintendent at the Rogers Works. In 1900 he became Assistant Superintendent of the Brooks Locomotive Works, and two years later was appointed Superintendent of the Brooks Works. This was on January 1, 1902, and after remaining here only 20 days he was appointed



driving generator, for export; Fairbanks, Morse & Co., Chicago, three engines for driving generators; Allis-Chalmers Co., Milwaukee, Wis., two engines for driving generators; Isthmian Canal Commission, for driving generator, and Western Electric Co., Chicago, for driving generator. Heating and ventilating apparatus, Trussed Concrete Steel Co., Youngstown, Ohio, for factory; Auburn (N. Y.) Light, Heat & Power Co., and American Shipbuilding Co., Lorain, Ohio, for a steamship.

#### TRADE PUBLICATIONS.

**Valves.**—The October issue of *The Valve World*, published by Crane Company, Chicago, contains an interesting article describing the new Bridgeport, Conn., factories of the company.

**Rail Anchor.**—The Railway Specialty & Supply Co., Chicago, is calling attention to the P. & M. rail anchor by a blotter containing an illustration of and descriptive matter about the device.

**Seals.**—The padlock seal, tin and lead combination seals, tin band seals and sealing presses for use on railroads is a subject of the catalogue just issued by the International Seal Co., New York.

**Steam Fan Regulator.**—The Mason Regulator Co., Boston, Mass., has recently issued a pamphlet which describes, with a cross section illustration, the Mason steam fan regulator for controlling boiler pressure.

**Nut Lock.**—The Jones Positive Nut Lock Co., Chicago, has issued Booklet No. 11, calling attention to the efficiency of the Jones positive nut lock in various uses. A part of the booklet describes the bolt head lock and steel chains made by the company.

**Sand Drier.**—The Indiana Foundry Co., Ltd., Indiana, Pa., has recently issued a small pamphlet containing descriptive matter and a number of illustrations on the Sutton sand drier, which should be of special interest to the railroad motive power department.

**Creosoted Wood Block.**—The Wyckoff Pipe Creosoting Co., Inc., New York, is distributing a catalogue entitled "Modern Pavements for Streets and Bridges." The creosoted wooden blocks described are used extensively for flooring machine shops, engine houses and foundries.

**Telephone Cables.**—The Western Electric Co., New York, is distributing booklet No. 1150 containing useful information regarding the telephone cable work, especially dry core cables, insulation resistance, electrostatic capacity, lead sheath, aerial and underground submarine, and interior cables.

**Valves.**—The American Balance Valve Co., Jersey Shore, Pa., has just issued booklet No. 28, which contains information regarding locomotive valves of various types made by this company, including semi-plug piston valves, the Jack Wilson high pressure slide valve and the American balance slide valve.

**Truing Device for Wood Working Machinery.**—S. A. Woods Machine Company, Boston, Mass., has just issued an instructive catalogue which describes Woods truing devices for attachment to wood working machinery by which the cutter knives are trued while the cutter head revolves at its regular working speed.

**Steel Wheels.**—The Carnegie Steel Co., Pittsburgh, Pa., has just issued a new booklet on Schoen steel wheels. The six stages in the manufacture of these wheels is shown in a series of six half-tone illustrations. The booklet also contains a number of illustrations of freight and passenger car equipment on which these wheels are used.

**Riveters.**—Catalogue No. 3, 64 pages, issued by the Hanna Engineering Works, Chicago, describes Hanna pneumatic, Pedrick & Ayer hydro-pneumatic and plain toggle riveters, screen shakers, revolving dumping riddles, radial reamers and other labor-saving tools and appliances. The publication is well illustrated with photographs and drawings.

**Cement.**—The November bulletin of the Universal Portland Cement Co., Chicago and Pittsburgh, contains an article on the rebuilding of the Chicago Union Stockyards wherein concrete construction was substituted for wood; also an article on "Artistic and Commercially Practicable Concrete Surface Finishes." A number of views accompany the descriptive matter.

**Automatic Stokers.**—The Detroit Stoker & Foundry Co., Detroit, Mich., is distributing an attractive catalogue of 48 pages, 6 in. x 9 in., illustrating and describing the Detroit automatic stokers. The catalogue contains a good deal of information regarding fuel combustion and a number of pages are devoted to the arrangement of the Detroit stoker with various types of boilers.

**Reinforced Concrete Construction.**—The October issue of *Designing Methods for Reinforced Concrete Construction*, published by the Expanded Metal & Corrugated Bar Co., St. Louis, Mo., takes up the subject of earth pressure against retaining walls, and gives two completed problems in the design of 16-ft. cantilever walls and one problem in the design of a 25-ft. buttress wall. The December number, which will be Bulletin No. 6, will contain a detailed design of a rectangular reservoir.

**Paint Results.**—A large three-page folder, printed on one side only, issued by the Goheen Manufacturing Co., Canton, Ohio, contains the report on the condition of the paint of the Crescent bridge over the Mississippi river at Davenport, Iowa, of the Davenport, Rock Island & Northwestern, on December 16, 1907. The deductions made by the Chief Engineer of the Goheen company and an employee of the railroad shows that span 4, painted with carbonizing coating, is still in good condition and will not need re-painting for one or two years, while other brands of paint used on adjoining spans have deteriorated to a greater degree. A comparison of the cost in cents per ton also shows favorably for the Goheen paint. A full-page cut of the Crescent bridge appears on the first page. A copy of the folder will be mailed to anyone interested.

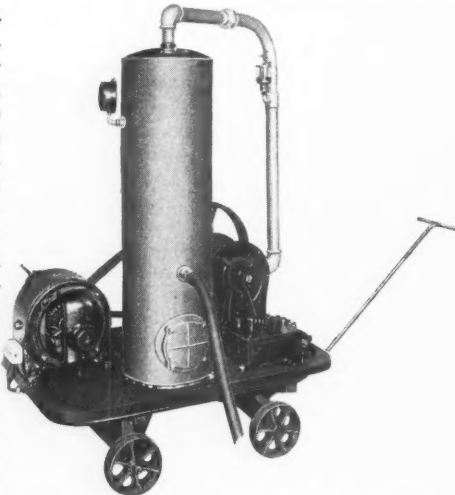
#### Our Ponderous Passenger Cars.

Does it ever occur to the passenger, when he is sweeping through the country in the luxurious comfort of his heavily upholstered seat in a Pullman car, that, in order to give him that accommodation, the railroad company must haul over the tracks, not merely his individual 150 lbs. of weight, but an additional two tons of weight of the car? The largest modern Pullmans will weigh over 60 tons; and, since they provide only 16 sections, it follows that for every passenger carried, even when the car is full, two tons of dead weight must also be moved. In respect of the weight hauled per passenger, therefore, a Pullman train is the most extravagant and costly method of transportation in the world, as the following comparative facts will show. A touring car capable, when running on a good road, and if, like the railroad train, unhindered by speed restrictions, will carry seven people at the same speed as a Pullman train. The machine will weigh about 3,500 lbs., or 500 lbs. to the passenger. A 7-h.p. motorcycle, weighing 150 lbs. and running on a good road without speed restrictions, will transport two people on the level at a speed of 40 miles per hour; while a bicycle, weighing only 25 lbs., can be driven by an ordinary rider on a good road at from 12 to 15 miles per hour, and by a racing man at from 20 to 25 miles an hour. Even that good old standby, the two-seated buggy, weighing, let us say, 320 lbs., will convey its two passengers in comfort and safety at a speed of from 15 to 20 miles an hour. Summing up our comparative results, then, we find that the dead weight necessary to carry a passenger in a touring car is 500 lbs., on a motorcycle 75 lbs., on a bicycle 25 lbs., and in a horse-drawn buggy 160 lbs., as against the enormous load of two tons of dead weight necessary for the transportation of a Pullman passenger. It may be objected that the Pullman car represents an extreme case, and that much of the weight is due to the provision of sleeping accommodations; but we find that, even in the first-

class day coach, the dead weight per passenger is very high, being, in the case of coaches accommodating, according to size, from 70 to 84 people, about  $1\frac{1}{3}$  tons of dead weight per passenger.—*Scientific American*.

#### Electrically-Driven Vacuum Car Cleaner.

The Green electrically-driven vacuum car cleaner shown herewith is mounted on an easy running truck,  $2\frac{1}{2}$  ft. x  $3\frac{1}{2}$  ft., making it convenient for use in car cleaning yards. This equipment consists of a rotary vacuum pump, driven by a two h.p. electric motor. The dust collecting tank, made of galvanized steel and solid brass, is so designed as to separate the incoming dust and dirt from the air before the latter enters the vacuum pump. The cleaning tools are of nickel plated brass. Further than the plant proper, as shown in the illustration, the equipment includes 50 ft. of hose made with heavy wire inserting to insure it against collapse; one 8-in. carpet cleaner; one  $4\frac{1}{2}$ -in. seat cleaner, and one edge tool. An arrangement has been made for using this equipment in yards where compressed air is available direct. The plant here shown is replaced by a vacuum producer to which is connected an air supply hose. The required vacuum is regulated by a small valve on the vacuum producer. The simplicity of this equipment is a leading feature, it being unnecessary to have a skilled operator. The National Vacuum Cleaning Co., Dayton, Ohio, is the maker.



Green Electric-Driven Vacuum Cleaner.

#### Closed Groove Ring Fixture Tip.

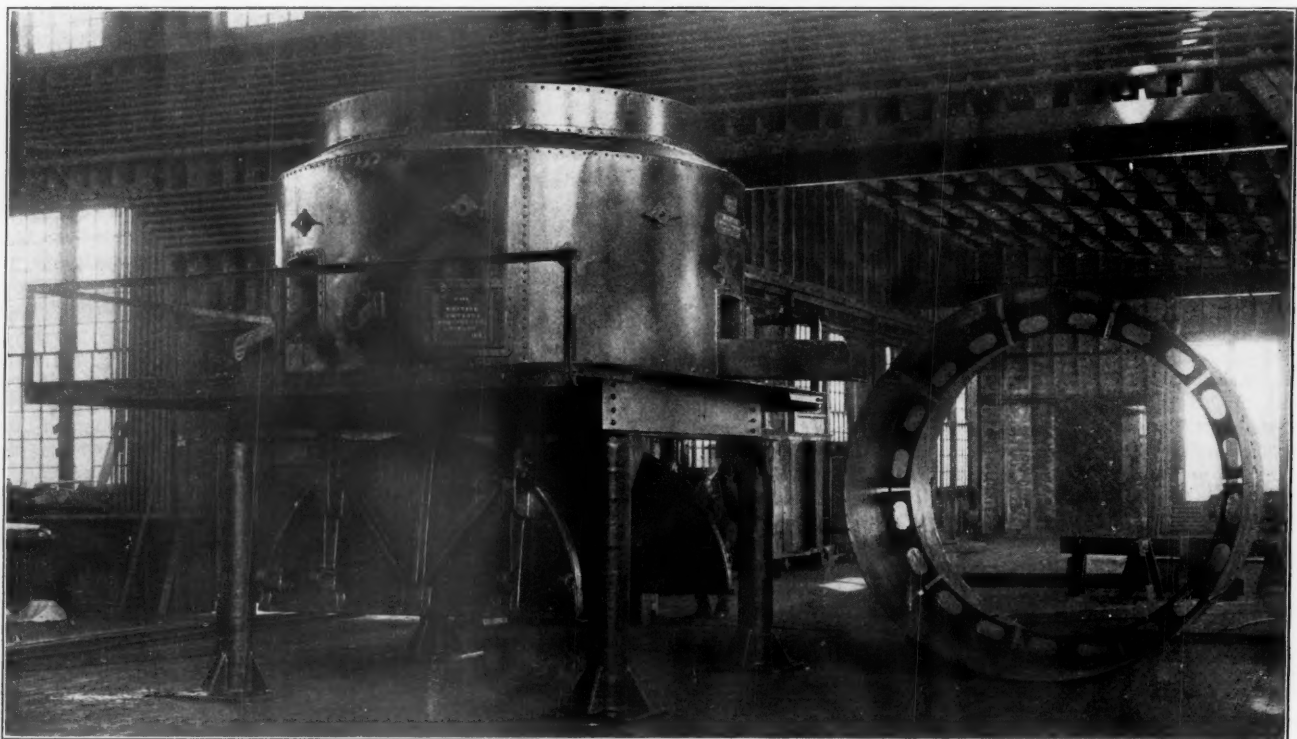
The ring fixture in the accompanying cut shows two positions of the most recent development of curtain fixtures of the Curtain Supply Co., Chicago and New York. This fixture is said to be positively self-rightening. The small flange at the center of the head, as seen in the illustration, strikes against a metal strip which overhangs the groove, and prevents the fixture from leaving the groove. The fixture cannot be made to bind when in an oblique position, as the flanges prevent it from attaining the necessary angle. The cut to the left of the illustration shows the fixture in its holding position. A section of the head is shown removed to illustrate the two loosely-mounted holding rings. An upward motion of the curtain causes these rings to strike against the bottom of the guiding grooves in the post, which, together with their weight, places the rings in a clamping position between the two lower pins. The curtain is thus held against upward movement due to the motion of the car, but may be raised by hand. The non-holding position is shown at the right of the illustration. The holding rings move out of contact with the groove bottom when the curtain is moved downward, allowing the fixtures to rest against the small rollers at the end of the tip. The rings fall into a locking position upon the curtain being released, as the spring in the roller tends to draw the curtain upward.



Ring Curtain Fixture.

#### Whiting Cupola for the Standard Cast Iron Pipe & Foundry Co.

The Whiting Foundry Equipment Co., Harvey, Ill., has installed two of its No. 12 cupolas in the plant of the Standard Cast Iron Pipe & Foundry Co., Bristol, Pa. While their de-



Whiting Foundry Cupola.



sign follows the principles of the standard Whiting cupola, several new features were added.

The shell is 108 in. in diameter and the wind-box 130 in. in diameter, with a 10½-in. lining, giving a capacity of 27 to 30 tons per hour. Each cupola is fitted with two rows of tuyeres, eight in each row. The bottom plate embodies some new features in cupola construction. On account of the extreme loads carried, it is made of heavy steel plate securely riveted to the shell and wind-box sheets and bolted to the bottom frame, which consists of heavy steel beams, securely riveted together. The hinge plates for the bottom doors are steel castings riveted to the structural steel frame. Straight cast iron columns of circular hollow section are substituted for the usual curved columns. Each column has a large flange, avoiding the use of a separate base plate.

The safety tuyere on this cupola is provided with a spout projecting through the shell of the wind-box. This spout is lined and is provided with the usual safety slide. It is located so that it can be always under the eye of the cupola tender. Owing to the size and height of the bottom doors, an operator's platform, built of structural material with a checkered plate floor and substantial hand rails, is provided.

#### American High Speed Radial Drill.

In the accompanying illustration is shown a 4-ft. triple geared high-speed radial drill recently put upon the market by the American Tool Works Co., Cincinnati, Ohio. This machine is made in 4, 5, 6 and 7-ft. arm sizes and the description herewith is generally applicable to all sizes.

The introduction of high-speed twist drills, which incorporate a great productive capacity combined with an ability to withstand severe usage of high speeds, has made it necessary to design and build a drilling machine to meet these new requirements. The accompanying tabulations of test results show very conclusively just what is possible with this machine. The following table gives the results obtained during a test, drilling steel 1 in. thick, using high-speed drills.

Size of drill.	Speeds		Feeds, in.		Back gears.		Actual h. p.	Amperes.
	Revs.	Cutting ft.	Per revs.	Per min.	Ratio.	Position.		
9/16-in. . .	356	52.3	0.012	4.27	1.48	Top.	4.2	14
5/8-in. . .	313	61.5	.012	3.75	1.48	"	10.8	36
1 1/16-in. . .	188	50.9	.024	4.51	1.48	"	9.0	30
1 1/8-in. . .	188	56.9	.024	4.51	1.48	"	9.3	31
1 3/16-in. . .	128	57.6	.024	3.07	4.22	Middle.	8.4	28
1 7/16-in. . .	167	86.2	.012	2.00	1.48	Top.	7.8	26

The voltage in the above test was 224. The following results were obtained, drilling cast iron 2 in. thick. The voltage in this case varied from 224 to 226.

Size of drill.	Speeds		Feeds, in.		Back gears.		Actual h. p.	Amperes.
	Revs.	Cutting ft.	Per revs.	Per min.	Ratio.	Position.		
1/2-in. . .	356	46.6	0.046	16.3	1.48	Top.	5.75	19
1-in. . .	216	56.6	.046	9.9	1.48	"	5.45	18
1 1/16-in. . .	313	84.5	.046	14.4	1.48	"	13.2	44
1 1/8-in. . .	313	99.8	.046	14.4	1.48	"	15.3	51
1 3/16-in. . .	216	83.1	.033	7.1	1.48	"	12.6	42
1 7/16-in. . .	216	97.0	.033	7.1	1.48	"	16.8	56
1 9/16-in. . .	128	66.0	.033	4.22	4.22	Middle.	15.6	52
3 1/2-in. . .	60	55.0	.024	1.44	4.22	Middle.	10.2	34

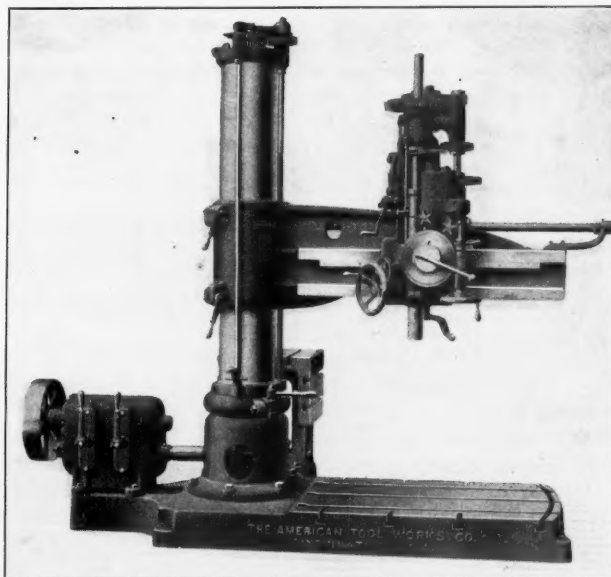
The following results were obtained during a tapping test, using pipe tops in cast iron, 2 in. thick. The voltage varied from 222 to 225.

Diam. of tap.	Speeds		Feeds, in.		Back gears.		Actual h. p.	Amperes.
	Revs.	Cutting ft.	Per revs.	Per min.	Ratio.	Position.		
4-in. . . . .	18	21.2	1/8	2 1/4	12.02	Bottom.	6.6	22
5-in. . . . .	18	26.2	1/8	2 1/4	12.02	Bottom.	7.7	26
6-in. . . . .	18	30.8	1/8	2 1/4	12.02	Bottom.	9.0	30

The feeding mechanism on the head provides eight distinct rates of speed. These feeds are obtained by a simple device, an indexed dial on the feed box, which is turned until the desired feed indication comes opposite a fixed pointer. The all-gear feeds, as opposed to belted feeds, insure increased productive capacity, rapidity of change and positive action. The feeds operate through a friction, which permits the drill to be crowded without straining the feeding mechanism. These feeds can be automatically tripped at any position of the spindle by an adjustable trip dog and pointer acting on a worm clutch. Two or more of these dogs may be supplied, making it possible to counterbore any number of holes without resetting. Particular attention is called to the power of

the frictions in the speed box. These gears are of a patent double band type, having very few parts in their construction. This permits the gears to be made of proportions sufficiently large to reduce slippage under the severest cuts. Loose and delicate parts, a source of frequent breakage, are dispensed with and it is said that there is absolutely no shock to the parts when throwing in any speed.

A motor of any type may be used on this machine, the connection being made either direct or through a gear, chain or belt. It is recommended, however, that a motor on the machine base connected by a gear to a four-speed box be used. The spindle has 24 changes of speed ranging from 18 to 356 in geometrical progression, any one of which is available without stopping the machine. This range of spindle speeds permits of the use of high or low-speed drills of large sizes in an equally efficient manner. The column is of the double tubular type. The sleeve, or outer column, revolves on conical roller bearings hardened and ground. This column may be clamped in any position by a V clamping ring, which arrangement makes the outer column practically integral with the inner one. The arm is a parabolic beam of tube section, which design gives great resistance to both bending and torsional strains. The lower line of the arm is seen to be parallel with the base, which permits work to be operated close to the column, without the necessity of an extreme reach of the spindle. This arm is clamped to the



American Triple Geared High Speed Drill.

column by two binder levers and is raised and lowered by double thread, coarse pitch screws which are on ball bearings and controlled by a convenient lever. The head is moved along the arm by a hand-wheel operating spiral pinion in a rack. This device is self-locking at all points and it is necessary to use the hand binder only in connection with the heavier operations. Triple gears are located on the head, which bring the greatest speed reduction direct to the spindle. These gears may be engaged or disengaged while the machine is in operation.

This machine is also designed for use in tapping. The tapping mechanism is carried on the head between the triple gears and the speed box, which gives the friction the benefit of a triple gear ratio, which makes very heavy tapping operations possible. Taps may be backed out at rapid speeds. The lever of the starting, stopping or reversing the spindle is controlled at the head from the front of the machine. The base is of massive proportions and strongly ribbed, especially at the point of the column support. The extension of the base at the back is drilled to receive a plain box or universal table as is seen in the illustration. The top surface of this table is 20 in. x 29 in., the side surface being of about the same area. Both side and top surfaces are supplied with T-slots. The regular equipment includes a plain box table, countershaft and cone pulley drive.

**Orders for Locomotives.**

An officer of the Baldwin Locomotive Works is quoted as follows: "We have been receiving orders, but they are small. I venture to say that there is not one railroad in the country that has given an order for more than 50 locomotives since the industrial depression set in. I do believe, however, that there will be an improvement shortly after election, provided Mr. Taft is to be our next President. The railroads will begin to improve their rolling stock. A number of them are now preparing specifications for the building of new locomotives."

**Electrification in Peru.**

According to a press despatch from Lima, Peru, it has been decided to electrify the Central Railroad of Peru, which connects Callao with Oroya in the mountains, and also has some branch lines. The road from Callao to Oroya is about 140 miles long. At present, 46 locomotives, 60 passenger cars and 320 freight cars are used.

**Pennsylvania Electrification.**

A unit price contract has been given to the Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa., for electrical apparatus for the New York tunnels and terminals of the Pennsylvania. This contract includes motors, generators, etc., for use in power house and rolling stock. Amounts needed have not yet been decided on, but it is estimated that the cost will be from \$3,000,000 to \$5,000,000. The designs for electric locomotives and motor cars are not fully worked out, and tests are still being made on Long Island with an experimental locomotive.

**Railroad Officers.****ELECTIONS AND APPOINTMENTS.****Executive, Financial and Legal Officers.**

J. T. Wellock has been appointed Auditor of the Cleveland, Akron & Columbus, with office at Cleveland, Ohio, succeeding F. H. Reeves, deceased.

The general offices in New York of the National Railroad of Mexico, the Mexican International, the Interoceanic of Mexico, and the Hidalgo & Northeastern, have been moved from 60 Wall street to 25 Broad street, where the present offices of the Mexican Central will be used by all of these roads.

A. M. Ingersoll, whose appointment as Vice-President of the Chicago, Milwaukee & St. Paul, in Washington, has been announced in these columns, began railroad work as a telegraph operator on the St. Paul. He served for 20 years in various capacities until 1888, when he resigned as General Agent of the Passenger Department at Milwaukee. On leaving the railroad he was for 16 years President of the Tacoma Warehouse & Elevator Co., at Tacoma, Wash., severing his connection with this company in 1906. Since that time and until his recent appointment he had acted in an advisory capacity for this road.

**Operating Officers.**

M. B. Cutter, General Manager of the Lehigh Valley, has resigned.

L. H. Phetteplace has been appointed Superintendent of the Carolina, Clinchfield & Ohio, with office at Johnson City, Tenn.

William Jefferis has been appointed Assistant Superintendent of the Utah division of the Union Pacific with headquarters at Green River, Wyo.

C. M. Graves has been appointed General Manager of the Spokane & Inland Empire, the duties of this office having been previously performed by J. P. Graves, President.

The offices of N. G. Pearsall, General Manager, and J. H. O'Donnell, Car Accountant of the New Orleans Great Northern,

have been moved from Covington, La., to Bogalusa, Washington Parish.

A. W. Newton has been appointed Superintendent of the Creston division of the Chicago, Burlington & Quincy Lines East of the Missouri river, succeeding C. T. Leonard, resigned, with office at Creston, Iowa.

C. F. Roberts, Trainmaster of the Denver & Rio Grande at Salt Lake City, Utah, has been transferred to Tucker, Utah. C. W. King, Chief Dispatcher at Salt Lake City, succeeds Mr. Roberts. William Upton succeeds Mr. King. F. O. Haymond, Trainmaster at Tucker, has been transferred to Birmingham Junction, Utah.

W. H. Jones has been appointed Acting Superintendent of the Idaho division of the Oregon Short Line at Pocatello, Idaho, succeeding George H. Olmstead, granted leave of absence on account of ill health. W. R. Armstrong has been appointed Acting Superintendent of the Montana division at Pocatello, succeeding Mr. Jones.

**Traffic Officers.**

Thad Franks has been appointed Commercial Agent of the Missouri, Kansas & Texas at Waco, Tex.

C. E. Redman has been appointed General Agent of the Las Vegas & Tonopah at Goldfield, Nev.

Charles Patton has been appointed Traveling Passenger Agent of the Atlanta, Birmingham & Atlantic, at Atlanta, Ga.

Martin Walsh has been appointed General Freight and Passenger Agent of the Memphis, Paris & Gulf at Nashville, Ark.

T. F. Powell has been appointed Division Freight Agent of the Erie at Meadville, Pa., succeeding W. A. Nelson, transferred.

W. A. Muse has been appointed Traveling Passenger Agent of the Seaboard Air Line at Atlanta, Ga., succeeding J. S. Etchberger, transferred.

Frank J. McKenna has been appointed Passenger Agent of the New York Central & Hudson River at Niagara Falls, N. Y., succeeding C. F. McDonald.

G. A. Carter has been appointed Commercial Agent of the Missouri, Kansas & Texas, at Dallas, Tex., succeeding S. F. Baker, assigned to other duties.

L. E. LeHane has been appointed Traveling Freight and Passenger Agent of the Chicago, Burlington & Quincy at Tacoma, Wash., succeeding Roy Kirkpatrick, resigned.

E. T. Reynolds, Traveling Freight Agent of the Pere Marquette at New York, has been appointed Eastbound Agent at New York. F. R. Yealland succeeds Mr. Reynolds. F. W. Goldie has been appointed Pacific Coast Agent at Portland, Ore.

W. G. Paine, General Passenger Agent of the Spokane & Inland Empire, has been appointed Traffic Manager, having charge of both freight and passenger business. J. H. Lothrop, General Freight Agent, has resigned to engage in other business.

R. W. Andrews has been appointed Freight and Passenger Agent of the Southern division of the Missouri & North Arkansas at Helena, Mo. R. M. Warner has been appointed General Freight and Passenger Agent of the Northern division at Neosho, Mo.

J. F. Fairlamb, General Passenger Agent of the New York Central & Hudson River and of the West Shore, has had his jurisdiction extended over the Boston & Albany. A. S. Hanson, formerly General Passenger Agent of the Boston & Albany, has been appointed General Agent at Boston, Mass.

The traffic departments of the Southern Indiana and the Illinois Southern have been separated. H. P. Radley has been appointed General Freight and Passenger Agent for the Southern Indiana, with office at Terre Haute, Ind. J. T. Averitt has been appointed General Freight Agent of the Illinois Southern with office at Chicago. J. E. Windsor will represent both companies as Coal Agent, with offices in the Old Colony building, Chicago.



**Engineering and Rolling Stock Officers.**

J. F. Schneider has been appointed Foreman of the Machine Shop of the Texas & Pacific at Marshall, Tex., succeeding D. J. Robinson, deceased.

William Daze, Road Foreman of Engines of the Atchison, Topeka & Santa Fe at Winslow, Ariz., has been appointed Master Mechanic at Winslow. C. C. Reynolds succeeds Mr. Daze.

D. D. Robertson has been appointed Master Mechanic of the Wyoming division of the Lehigh Valley, succeeding A. M. Gill, promoted to General Inspector of Motive Power and Rolling Stock.

N. H. Jacobsen, Principal Assistant Engineer of the Chicago & Western Indiana, has been appointed Assistant Engineer, succeeding C. A. Smith. The office of Principal Engineer has been abolished.

J. T. Connor has been appointed Acting Superintendent of Motive Power and Machinery of the Houston, East & West Texas, Houston & Texas Central and Houston & Shreveport, succeeding S. Millican, deceased.

C. F. Smith has been appointed Master Mechanic in charge of all steam and electrical equipment of the Tombigbee Valley, with office at Calvert, Ala. Mr. Smith for the last three years has been Special Representative for the Cataract Refining Co., Buffalo, N. Y.

G. W. Trout has been appointed Signal Supervisor of the Missouri division of the Chicago, Rock Island & Pacific, with office at Cedar Rapids, Iowa. In our issue of last week we erroneously mentioned him as being Signal Engineer of the St. Louis & San Francisco.

F. K. Tutt, Master Mechanic of the Missouri Pacific and St. Louis, Iron Mountain & Southern at Osawatomie, Kan., has been appointed Master Mechanic at St. Louis, succeeding J. J. Reid, resigned. M. M. Myers, Master Mechanic at De-Soto, Mo., succeeds Mr. Tutt, and P. J. Conrath succeeds Mr. Myers.

C. W. Tessiers, whose appointment as General Foreman, Car Department, of the Mexican Central, has been announced in these columns, was born in 1859 at Natchitoches, La., and after a public school education and some years of railroad work in the bridges and buildings department, began work in the car department as carpenter of the International of Mexico in 1899. For six years he worked on coaches, and in 1905 was made Car Foreman, which position he held until his recent appointment.

**Purchasing Officers.**

E. K. Conneely has been appointed Purchasing Agent of the Pittsburgh & Lake Erie, with office at Pittsburgh, succeeding R. Evans, resigned.

J. K. Witman has been appointed Superintendent of Materials and Supplies of the Philadelphia & Reading, succeeding John H. Rankin, deceased.

**OBITUARY.**

F. J. Schmeiser, Supervisor of Signals of the Toledo & Ohio Central, died suddenly on October 30.

Thomas E. Jarrett, formerly General Superintendent of the Kansas City Southern, died at Shreveport, La., on October 29.

Frank P. Boatman, who until August, 1897, had been in active railroad life for 34 years, died at his home in Indianapolis, Ind., on October 21. He was born at Zanesville, Ohio, January 30, 1848, and began railroad work in October, 1863, as a machinist on the Central Ohio, now part of the Baltimore & Ohio. In January, 1891, he was made Superintendent of Motive Power of the Cleveland, Cincinnati, Chicago & St. Louis, and in February, 1892, was appointed Master Mechanic of the Louisville Southern, now part of the Southern Railway. He was appointed Superintendent of Motive Power of the Omaha & St. Louis, now part of the Wabash, in October, 1893, which position he held until August, 1897, when he retired from active life.

**Railroad Construction.**

**New Incorporations, Surveys, Etc.**

**BALLINGER & ABILENE.**—This company, organized in 1907 to build a line from Ballinger, Tex., north to Abilene, 55 miles, will, it is said, let contracts for the work soon. W. J. McDaniel, Chief Engineer, Ballinger. (July 3, p. 456.)

**BIRMINGHAM & SHADES MOUNTAIN.**—Organized in Birmingham, Ala., to build a railroad from Birmingham southwest to the top of Shades mountain, about 20 miles. Stephen Smith and G. T. Brozelton, both of Birmingham, are interested.

**BONLEE & WESTERN.**—An incorporator writes that this company is building a line west from Causey, N. C., with its own men. The company was incorporated recently to build 14 miles of railroad in North Carolina in Chatham and Randolph counties. J. H. Dunlap, President, Pt. Dillon, S. C. (October 23, p. 1226.)

**BUENAVISTA & NORTHWESTERN.**—Incorporated in Georgia, with \$200,000 capital, to build a railroad from Buenavista, Ga., on the Central of Georgia, northwest to Mauk, on the Atlanta, Birmingham & Atlantic, about 17 miles. The incorporators include: J. A. McLeady, C. V. Sprinkle, S. G. Collier, W. S. Lounsburg, H. V. Wilson, John Y. Smith, S. L. Lloyd, E. W. Lively, J. G. Wynn and E. R. De Borde, all of Atlanta.

**BUFFALO & LAKE ERIE TRACTION.**—This company recently made an extension of its road from Angola, N. Y., to Farnham, five miles.

**CHICAGO & MILWAUKEE (ELECTRIC).**—It is said that this company began operating the Evanston, Ill., to Milwaukee, Wis., line Oct. 31st. (October 16, p. 1175.)

**CHICAGO, ROCK ISLAND & PACIFIC.**—The annual report of this company for the year ended June 30, 1908, says that the line from Irving, Tex., to Carrollton, being built by the Chicago, Rock Island & Gulf, has been practically completed. The line is laid with 60-lb. rail and is gravel ballasted. A 280-ft. steel bridge was built over the Elm fork of the Trinity river on the line between Amarillo, Tex., and Tucumcari, N. Mex. This line has been under construction by the Chicago, Rock Island & Gulf and the Chicago, Rock Island & El Paso companies, upon which no work was done during the three preceding fiscal years. The 20.6 miles between Amarillo and Wildorado were placed in operation on May 11. This line is also laid with 60-lb. rails.

**COLORADO & SOUTHERN.**—An officer writes that surveys have been made for a line from Pueblo, Colo., south to Walsenburg, 56 miles. It is not yet decided when work is to be started. The new line may be used jointly by the C. & S. and the Denver & Rio Grande. The C. & S. now uses the tracks of the D. & R. G. between these places.

**COLORADO INTERURBAN.**—The Interurban Construction Company, of which E. M. Reaser is President; G. P. Vanlaw, Vice-President, and C. H. Pierce, General Manager, all of Denver, Colo., is financing this projected line to be built from Denver, Colo., north to Greeley, about 55 miles. The line will parallel the Union Pacific nearly all the way. A branch is projected from Lupton, about 25 miles north of Denver, west through the coal fields to Idaho creek, about 10 miles.

**CORSICANA-PALESTINE INTERURBAN.**—President J. V. Watkins is reported as having said that surveys are made and right of way secured for this line from Corsicana, Tex., southeast to Palestine, about 60 miles, and the contracts will be let early next year. G. A. Duren, Chief Engineer, Corsicana.

**DAYTON, LEBANON & CINCINNATI (ELECTRIC).**—This line, which is building from Dayton, Ohio, south to Lebanon, connects with the Cincinnati, Lebanon & Northern at the latter place. There are now 27 miles of this line in operation and about two miles more to be completed, including a cut of about 154,000 yds.

**KANSAS CITY, MEXICO & ORIENT.**—An officer is quoted as saying that the 13-mile gap from Chillicothe, Tex., to the Pease

river has been closed. All that prevents the operation of trains from Wichita, Kan., south to Sweetwater, Tex., is the bridge over the Pease river. The piling for this bridge is being driven now, and it is expected the work will be finished in about six months. (October 16, p. 1176.)

**MEXICAN ROADS.**—Work, it is said, is being pushed to complete, before the rainy season commences, the line being built by Percy M. Furber, of the Oil Field Co., of Mexico City, from the works of the latter at Fubero, Vera Cruz, to the port of Tuxpan, 50 miles. About  $4\frac{1}{2}$  miles of track have already been laid. A. C. Payne, Mexico City, general manager. Mr. Armstrong is chief engineer in charge of the work, and Mr. Leverage, superintendent of construction. Martin de La Hayee is superintendent of bridges and building. (R. R. G., April 24, p. 591.)

**PARRAL & DURANGO.**—L. M. Dudley, of Chihuahua, has finished grading on extension of this road from Mesa de Sandia, Durango, south  $12\frac{1}{2}$  miles. Track is now being laid by the railroad company. (July 31, p. 647.)

**PENNSYLVANIA ROADS (ELECTRIC).**—Residents of Altoona are interested in a project to build an electric line from Altoona, Pa., south to Bedford, about 50 miles. The Merchants' Association and the Chamber of Commerce of Altoona are said to be interested.

**RICHMOND, URBANA & PENINSULAR (ELECTRIC).**—Incorporated in Virginia to build a line from Urbana, Va., southwest to West Point. Surveys have been made and the right of way secured for nearly the entire length of the line. It is contemplated to begin construction at an early date. Press reports to the effect that this road is to connect all of the roads owned by the Gould interests in Virginia are incorrect. J. C. Robertson, President, Richmond, Va.

**SAVANNAH VALLEY.**—Contract is reported let to J. W. Wright, Jr., for building this proposed line. The company was organized recently with \$50,000 capital to build a line from Garnett, Ga., south to Sylvania, about 15 miles. E. T. Comer and L. J. Kilpatrick, both of Mill Haven, are directors. (August 14, p. 741.)

**SPOKANE & INLAND EMPIRE (ELECTRIC).**—P. Graves, President, announces that the company has no intention of giving up its franchise to build a tunnel in the business district of Spokane, Wash. It is said that work will begin next February and the company has three years in which to have one track in operation. The tunnel will be in Front avenue, and will cost \$1,000,000.

**SPRINGFIELD & JACKSON (ELECTRIC).**—Incorporated in Illinois with a capital stock of \$100,000 to build a line through Sangamon and Morgan counties from Springfield, Ill., to Jacksonville. The incorporators include D. H. Sims, D. B. Sims, and O. J. Lucas, of Latham, Ill.; S. T. Stanley and C. R. Cronk, of Chicago.

**UTAH COPPER CO.**—Press reports indicate that this company will shortly begin construction of its standard gage railroad between its mines and mills in Garfield, Utah, about 19 miles. It is also said that it will cost \$1,000,000 to build and equip this road.

**WINONA INTERURBAN.**—At the annual meeting of this company, it is said, \$300,000 was subscribed to complete work on the Warsaw-Peru division.

## Railroad Financial News.

**CANADIAN NORTHERN.**—A mortgage securing an issue of £1,622,587 (\$8,112,935)  $3\frac{1}{2}$  per cent. 50-year debenture stock guaranteed by the Dominion of Canada, has been filed. This stock was authorized by the Canadian Parliament to be issued at \$13,000 per mile on 609 miles of projected branches in Manitoba and Saskatchewan.

**CLEVELAND STREET RAILWAY.**—See Municipal Traction Co.

**COLORADO & SOUTHERN.**—Hallgarten & Co. and William Salomon & Co., both of New York, are offering the unsold portion of a block of \$5,000,000 refunding and extension mortgage  $4\frac{1}{2}$  per cent. bonds of 1905-1935, at 86, yielding  $5\frac{1}{2}$

per cent. This is part of an authorized issue of \$100,000,000, of which \$25,133,000 have been issued.

**HUDSON COMPANIES.**—The entire \$5,000,000 three-year 6 per cent collateral notes offered to preferred stockholders at par have been subscribed for. The proceeds from these notes and the sale of real estate is to be used to pay the Hudson & Manhattan Railroad in cash in lieu of completing the "Grand Circuit" of the Hudson tunnels in the city of New York. This work is to be done by the Hudson & Manhattan Railroad, which now operate the tunnels.

**INTEROCEANIC OF MEXICO.**—The directors have voted to exchange the existing £1,000,000 (\$5,000,000) 7 per cent. cumulative preferred stock for an equal amount of 5 per cent. non-cumulative preferred stock, and to give in addition £400,000 (\$2,000,000) first preferred stock and £1,000,000 (\$5,000,000) second preferred stock in exchange for the surrender of the cumulative rights and the cumulative dividends to June 30, 1907. The first and second preferred stocks issued under this plan will be the only preferred stock issued.

**LORAIN & WEST VIRGINIA.**—See Wheeling & Lake Erie.

**MUNICIPAL TRACTION CO. (CLEVELAND).**—A suit has been brought to put both this company and the Cleveland Street Railway Co. in the hands of receivers. Judge R. W. Taylor, of the Federal court, on November 4 made the following statement from the bench: "I must confess that from the facts here presented I see no escape from the appointment of a receiver to preserve the rights of the different companies, the mortgage holders and the public as represented by the city of Cleveland." Judge Taylor said that the only question in regard to the appointment of a receiver was the solvency or insolvency of the Municipal Traction Co. He reserved decision until November 7 on the general question of a receivership. In the meantime the Municipal Traction Co. is operating the street railway lines of Cleveland.

**NORFOLK & SOUTHERN.**—The receivers recommend that they be permitted to issue \$1,000,000 receivers' certificates to complete an eight-mile bridge over Albemarle Sound and for other improvements. They are paying the interest due November 1 on the \$1,655,000 first mortgage 5 per cent. bonds and \$1,800,000 collateral trust notes, but have defaulted on \$14,000,000 first and refunding bonds.

**SOUTHERN INDIANA.**—The Girard Trust Co., Philadelphia, Pa., has asked for a receiver and brought foreclosure proceedings under the first mortgage against the Southern Indiana. M. J. Carpenter, who had already been appointed receiver in suit brought by the First Trust & Savings Bank, Chicago, under the second mortgage, has been appointed also receiver in the suit under the first mortgage.

**UNION TRACTION CO. OF PHILADELPHIA.**—The stockholders have approved the use by the Philadelphia Rapid Transit of the securities owned by the Union Traction Co. as collateral for a proposed new loan of \$5,000,000. The stockholders of the Transit company have also approved the loan. John H. Chestnut, William P. Betz, J. S. Disston, Henry Fernberger, E. M. Story and J. J. Sullivan have been elected Directors, succeeding John B. Parsons, P. A. B. Widener, George D. Widener, W. H. Shelmerdine and George H. Earle, Jr.

**VIRGINIAN RAILWAY.**—Stockholders are to vote November 6 on the proposal to increase the authorized capital stock from \$33,500,000 to \$36,000,000.

**WABASH-PITTSBURGH TERMINAL.**—The United States Circuit Court has authorized the receivers to issue certificates amounting to \$974,211 for improvements and for the purchase of equipment.

**WHEELING & LAKE ERIE.**—Judge Taylor, in the United States Circuit Court at Cleveland, Ohio, has issued an order permitting the receiver of the Wheeling & Lake Erie to return the Lorain & West Virginia, extending from Wellington north to Lorain, 30 miles, to its original owners. The Wheeling & Lake Erie has been released from its guarantee of the L. & W. Va. \$2,000,000 50-year 4 per cent. bonds of 1906-1956.



# ANNUAL REPORTS

## THE CHICAGO, ROCK ISLAND AND PACIFIC RAILWAY COMPANY—TWENTY-EIGHTH ANNUAL REPORT.

### To the Stockholders:

The Board of Directors herewith submit their report of the operations and affairs of the Rock Island Lines for the fiscal year ended June 30, 1908.

The results of the operations for the year were as follows:

Total operating revenue (decrease \$1,654,476.40, or 2.8 per cent.)	\$58,484,196.88
Operating expenses (increase \$1,515,925.27, or 3.7 per cent.)	42,328,747.71
Net operating revenue (decrease \$3,170,401.67, or 16.4 per cent.)	\$16,155,449.17
Taxes (increase \$113,856.48, or 6.8 per cent.)	1,789,894.79
Operating income	\$14,365,554.38
Miscellaneous income	321,201.19
Total income	\$14,686,755.57
Interest and rentals	9,968,653.16
Balance of income, after providing for all charges, being 6.2 per cent. on capital stock (\$75,000,000)	\$4,718,102.41
Dividends paid (5¼ per cent. on capital stock)	3,929,785.00
Balance surplus for the year	\$788,317.41

To afford proper comparison, the percentages of increase and decrease are computed on basis of last year's figures revised according to Interstate Commerce Commission classifications now in effect.

The capital stock of the Chicago, Rock Island & Pacific Railway Company outstanding at the close of the previous fiscal year was \$74,854,100, and has since been increased by the issue of \$5,500 in exchange for \$5,000 capital stock of the Burlington, Cedar Rapids & Northern Railway Company and \$500 capital stock of the Rock Island & Peoria Railway Company.

During the year the funded debt increased \$6,268,060, equipment notes decreased \$433,459 and the three year notes for \$7,500,000 were paid July 1, 1907, when due; making a net decrease in funded and other fixed interest-bearing debt of \$1,665,459.

The cost of property and franchises increased \$6,187,245.68. There were also expended \$3,902,698.07 for additions and improvements.

Trackage rights over the Louisiana & Arkansas Railway and the Louisiana Railway & Navigation Company from the former terminus of the track near Winnfield, La., to Alexandria, La., were taken over for operation on October 1, 1907. On February 1, 1908, the new line was opened from Alexandria, La., to Eunice, La., where it connects with the Colorado Southern, New Orleans & Pacific Railroad, now under construction between Houston, Tex., and Baton Rouge, La., the completion of which is expected at an early date, when a through line into New Orleans will be established. This line, built by the Rock Island, Arkansas & Louisiana Railroad Company, is laid with 60-lb. steel rail and is ballasted with gravel. Bridges, stations, water tanks and other structures are of Rock Island standards.

Under the first mortgage of the Rock Island, Arkansas & Louisiana Railroad Company, dated January 1, 1906, there have been issued during the year \$1,500,000 additional bonds on account of the construction of the line from Alexandria, La., to Eunice, La., making a total issue to date of \$9,000,000. These additional bonds were purchased by your company and have been added to the \$7,500,000 previously deposited as security for the \$6,000,000 collateral trust notes due April 1, 1908, which were extended for one year at 6 per cent.

### GENERAL.

The industrial department records show the establishment along the lines of your company, during the fiscal year, of 290 new industries. The promoters are estimated to have expended over \$9,000,000 on the plants, and intend to employ nearly 9,000 persons.

Four new side tracks were built to mines and 63 to private industries; extensions were added to one mine track and to 21 tracks to private industries.

There were acquired 51 locomotives, 30 passenger train cars, 2,947 freight train cars and one service car, all being new equipment.

The line from Irving, Tex., to Carrollton, Tex., reported as under construction by the Chicago, Rock Island & Gulf Railway Company on June 30, 1907, has been practically completed. It is laid with 60-lb. steel rail and is gravel ballasted; a 280-ft. steel bridge was erected over Elm Fork of Trinity river, and all structures are standard.

Of the line between Amarillo, Tex., and Tucumcari, N. Mex., which has been shown as under construction by the Chicago, Rock Island & Gulf and Chicago, Rock Island & El Paso Railway companies, and upon which no work was done during the three preceding fiscal years, 20.64 miles between Amarillo and Wildorado, Tex., were placed in operation May 11, 1908. The line is laid with 60-lb. steel rail and

standard station buildings are in process of erection at Bush and Wildorado.

The work of installing automatic block signals between Chicago and Rock Island, Ill., and between Herington and McFarland, Kan., has been completed during the year.

The advances by your company on account of construction and equipment of the Trinity & Brazos Valley Railway aggregate \$1,284,955.26, of which \$1,187,539.76 were advanced during the current year. For \$697,247.69 of these advances and interest on all advances to June 12, 1908, your company received \$802,000, par value, 4¼ per cent. refunding and extension bonds of the Colorado & Southern Railway Company, leaving outstanding advances of \$587,707.57.

During the year \$284,093.78 were advanced for the terminals at Galveston, Tex., and \$26,497.24 for the terminals at Houston, Tex.

In last year's report mention was made of the expenditure of \$4,089,934.18 for additional and improved terminals at various other points. To complete these terminals and for additional similar work your company has disbursed \$1,521,044.40 during the current year.

The Memphis Railroad Terminal Company was incorporated March 5, 1907, for the purpose of erecting a new passenger station with requisite buildings and tracks at Memphis, Tenn. This company, with nine other railroad companies centering in Memphis, has joined in the guarantee of the necessary funds (\$1,200,000) to purchase property for the station. The capital stock of the company is \$100,000, of which each of the 10 roads holds one-tenth, of \$10,000.

The recent business depression caused a serious decrease in your gross earnings, which decrease was met, as far as thought advisable and practicable, by a reduction in operating expenses—the integrity and efficiency of the property and duty to the public having been given careful consideration.

One of the difficult features of this business depression which adversely affected operating results is found in the empty freight car movement, which increased nearly 23,000,000 miles; when the sudden falling off in freight traffic came, not only were your lines well covered with foreign cars, which must be returned to their owners empty, to avoid further per diem charges, but, being an intermediate road, was flooded with empty cars being returned from western lines to those in the east, and vice versa. A vast amount of transportation expense (approximately \$1,000,000) was incurred in moving this equipment without revenue, and our hire of equipment debit balance increased \$461,258.76—the latter, however, partly on account of the increased per diem rate.

During the year your company sold all except 7,700 shares (preferred) of its holdings of stock of the Chicago & Alton Railroad Company to the Toledo, St. Louis & Western Railroad Company, receiving therefor that company's gold bonds of 1917.

The accounts of your company at the close of the fiscal year were examined by Mr. Stephen Little.

By order of the Board of Directors:

B. L. WINCHELL,

October 21, 1908.

President.

### Income Account; Year Ended June 30, 1908, Compared with Previous Year.

	1907-08.	1906-07.	Amount.	Increase or decrease. Per cent.
Avg. mil'ge operated.	7,969.53	7,780.26	189.27	2.43
Rev. from transp.:				
Freight	\$37,899,356.36	\$40,215,901.41	\$2,316,545.05	5.76
Passenger	16,693,110.45	16,153,539.42	539,571.03	3.34
Mail	1,398,173.95	1,356,868.48	41,305.47	3.04
Express	1,424,183.36	1,373,765.79	50,417.57	3.67
Miscellaneous	701,800.51	745,426.82	\$43,626.31	5.85
T'l transp'n revenue	\$58,116,624.63	\$59,845,501.92	\$1,728,877.29	2.89
Rev. from operations other than transp.	367,572.25	293,171.36	74,400.89	25.38
T'l operat'g revenue	\$58,484,196.88	\$60,138,673.28	\$1,654,476.40	2.75
Operat'g expenses:				
Maint. way & struct.	\$8,319,804.25	\$9,146,540.35	\$826,736.10	9.94
Maint. of equipment	7,490,381.62	6,963,276.71	527,104.91	7.57
Traffic expenses	1,488,114.58	1,610,429.48	122,314.90	7.60
Transport'n expenses	23,655,277.71	21,719,981.43	1,935,296.28	8.91
General expenses	1,375,169.55	1,372,594.47	2,575.08	0.19
T'l operat'g expenses	\$42,328,747.71	\$40,812,822.44	\$1,515,925.27	3.71
Net operating rev.	\$16,155,449.17	\$19,325,850.84	\$3,170,401.67	16.40
Taxes	1,789,894.79	1,676,038.31	113,856.48	6.79
Operating income	\$14,365,554.38	\$17,694,812.53	\$3,284,258.15	18.61
Outside operations (debit balance)	\$92,727.28	\$59,449.90	\$33,277.38	55.93
Hire of equipment (debit balance)	719,711.61	258,452.85	461,258.76	178.47

Other income.....	\$1,133,640.08	\$931,511.53	\$202,128.55	21.70
Total .....	\$321,201.19	\$613,608.78	\$292,407.59	47.65
Total income.....	\$14,686,755.57	\$18,263,421.31	\$3,576,665.74	19.58
Interest .....	\$8,413,221.92	\$8,279,300.02	\$133,921.90	1.62
Rentals .....	1,545,231.70	1,195,927.71	349,303.99	29.21
Betterments on leased lines .....	10,199.54	37,676.51	27,476.97	72.93
Total charges.....	\$9,968,653.16	\$9,512,904.24	\$455,748.92	4.79
Balance of income (available for divs.)	\$4,718,102.41	\$8,750,517.07	\$4,032,414.66	46.03
Dividends .....	3,929,785.00	4,116,728.00	186,943.00	4.54
Balance surplus (carried to credit of profit and loss)...	\$788,317.41	\$4,633,789.07	\$3,845,471.66	82.99

NOTE.—Decreases are in italics.

In the preceding and following statements, all revenues, operating expenses, and other income for the year ended June 30, 1908, are stated in accordance with the classifications required by the Interstate Commerce Commission, effective July 1, 1907. To furnish proper comparisons, the corresponding figures for the year ended June 30, 1907, are also re-stated, where necessary.

Dividends Declared During Year Ended June 30, 1908.			
Dividend No. 109, 1½ per cent. paid October, 1907.....	\$1,309,910		
Dividend No. 110, 1 per cent. paid January, 1908.....	748,520		
Dividend No. 111, 1½ per cent. paid April, 1908.....	1,122,780		
Dividend No. 112, 1 per cent. paid July, 1908.....	748,575		
Total.....	5¼ per cent.	\$3,929,785	

Profit and Loss.			
	Debit.	Credit.	
By balance as of June 30, 1907.....		\$19,123,124.11	
By surplus for year ended June 30, 1908		788,317.41	
By interest prior to current fiscal year on advances for:			
St. Louis, Mo., freight terminals.....		10,529.08	
Kansas City, Mo.; Cedar Rapids, Ia.; Peoria, Ill., and Carbon Cliff, Ill., properties .....		9,066.40	
By sundry liabilities written off.....		24,334.73	
To discount, commissions and expenses on bonds issued and sold and on notes extended .....	\$2,263,863.82		
To depreciation on:			
Tracks removed .....	32,093.25		
Structures sold, removed or destroyed.	36,886.69		
Equipment sold or destroyed.....	1,458,920.42		
To sundry uncollectible accts. written off	4,485.50		
To balance .....	16,159,122.05		
		\$19,955,371.73	\$19,955,371.73
By balance brought down.....			\$16,159,122.05

#### Condensed General Balance Sheet, June 30, 1908, and Comparison with Previous Year.

Assets.			Liabilities.		
	1908.	1907.		1908.	1907.
Capital assets:			Capital liabilities:		
Property and franchises.....	\$249,685,627.88	\$243,498,382.20	Capital stock .....	\$75,000,000.00	\$75,000,000.00
Additions and improvts., current year .....	3,902,698.07	4,375,221.38	Funded debt .....	191,850,000.00	185,582,000.00
Advances for construction and equipment...	4,093,461.58	4,385,825.57	Equipment notes .....	6,951,541.00	7,385,000.00
Real estate .....	641,991.02	639,949.98	Three-year notes, due July 1, 1907 .....		7,500,000.00
Investment acct.—stocks representing ownership of Rock Island Lines in sundry properties..	1,950,422.39	10,971,140.49	Collateral trust gold notes, due April 1, 1909 (extended one year from April 1, 1908).....	6,000,000.00	6,000,000.00
Bonds of Toledo, St. L. & Western R. R. Co., Rock Island Improvem't Co., equipm't purchase under indenture of Feb. 1, 1907.....	7,892,369.90	7,533,550.00	Total .....	\$279,801,541.00	\$281,467,000.00
Am. Loco. Co., equipment purchase under indenture, Oct. 15, 1907.	782,055.00				
1st and refund'g mort. gold bonds—pledged against three year notes due July 1, 1907.....		11,250,000.00	Current liabilities:		
Total .....	\$278,069,177.07	\$282,654,069.62	Unpaid vouchers & drafts	\$4,489,081.52	\$2,845,601.08
Current assets:			Unpaid wages .....	1,983,342.09	2,556,021.30
Cash .....	\$2,485,735.98	\$9,917,499.05	Interest, rentals and dividends due July 1....	2,372,904.00	2,788,589.00
Station agents and conductors:			Taxes accrued (not due).	1,124,040.37	1,075,398.00
Dr..... \$1,958,305.88			Interest and rentals accrued (not due).....	1,485,547.67	1,342,077.14
Cr..... 92,391.73			Interest coupons due and not presented .....	284,527.50	212,065.00
Companies & individuals:			Dividends due and not called for .....	5,986.32	7,007.07
Dr..... \$3,424,270.53			Bonds matured, not presented .....	7,900.00	26,500.00
Cr..... 329,623.36			Notes payable .....	3,520,000.00	150,000.00
Traffic balances:			Interim certificates for 1st and refund'g mort. gold bonds .....		3,000,000.00
Dr..... \$591,065.10			Total .....	\$15,273,329.47	\$14,003,258.59
Cr..... 588,881.70					
Express companies ....	2,183.40	*149,950.78	Deferred liabilities:		
U. S. post office dept..	348,052.38	303,125.21	Keokuk & Des Moines Ry. Co.—account equipm't.	\$197,562.25	\$197,562.25
Advances for construction, equipm't, etc., fund'ble	356,662.62	411,369.35	White & Black River Val. Ry. Co.—acct. equip't.	25,170.00	25,170.00
Loans and bills receivable.	711,060.89	854,692.62	Total .....	\$222,732.25	\$222,732.25
1st and refunding mort. gold bonds—pledged against notes payable.	3,283,019.99	2,217,133.19	Total liabilities.....	\$295,297,602.72	\$295,692,990.84
Bonds, etc., in treasury—unpledged .....	4,606,500.00				
Stocks in treasury—unpledged .....	14,918,133.71	10,087,795.80	Provisional accounts:		
Accrued income from investments .....	921,131.23	910,068.01	Reserve for replacement of equipment .....	\$2,366,011.38	\$561,438.27
Prepaid insurance.....	194,076.27	155,406.49	Insurance fund .....	436,285.63	447,670.28
Material and supplies...	166,891.52	156,123.30	Hospital fund .....	47,401.63	40,338.61
Total .....	\$38,210,587.99	\$34,401,989.60	Special improvement and equipment fund .....	2,043,171.52	2,108,279.54
Deferred assets:			Total .....	\$4,892,870.16	\$3,157,726.70
Open carrying accounts in process of adjustment:			Grand total liabilities (incl. provis'l accts.)	\$300,190,472.88	\$298,850,717.54
Dr..... \$1,089,070.45			Profit and loss.....	16,159,122.05	19,123,124.11
Cr..... 1,019,240.58			Grand total.....	\$316,349,594.93	\$317,973,841.65
Grand total.....	\$316,349,594.93	\$317,973,841.65			

NOTE.—In stating the assets and liabilities of the companies forming the Rock Island Lines, the holdings of the Chicago, Rock Island & Pacific Railway Company in the bonds and capital stock of the auxiliary lines, together with loans between the various companies, have been eliminated from the liabilities, and a like reduction made in the assets pertaining thereto; the figures shown, therefore, represent the book value of the assets and the liabilities without duplication.

The figures for 1907 have been, in a few instances, re-stated to compare with those for 1908, but the totals are one and the same.

Figures in italics denote decreases.

\* Credit.



## Securities Owned June 30, 1908.

In Current Assets.		Face value.	Book value.
Included in advances for construction, equipment, etc., fundable:			
Stocks:			
Rock Island-Frisco Terminal Ry. Co....		\$299,700.00	
Bonds:			
Rock Island-Frisco Terminal Ry. Co....		234,000.00	
Total stocks and bonds.....		\$533,700.00	
Included in first and refunding mortgage gold bonds pledged against notes payable:			
Chicago, Rock Island & Pacific Ry. Co..		\$4,944,000.00	
Included in bonds, etc., in treasury—unpledged:			
Atchison Union Depot & R. R. Co.....		\$4,500.00	
Chicago, R. I. & P. R. Co. (of Iowa)....		490,837.50	
Consolidated Indiana Coal Co.....		273,000.00	
Crawford County Mining Co.....		616,000.00	
Dawson Ry. & Coal Co.....		250,000.00	
Dering Coal Co.....		450,000.00	
Kankakee & Seneca Ry. Co.....		325,000.00	
Kansas City & Northwestern Ry. Co....		8,000.00	
Minnesota Transfer Ry. Co.....		46,000.00	
*Peoria Ry. Terminal Co.....		1,500.00	
Rock Island Improvement Co.....		1,029,080.94	
Rock Island Imprvt. Co.—equip. series A		3,150,000.00	
Rock Island Imprvt. Co.—equip. series B		4,200,000.00	
Chicago & Alton R. R. Co., sinking fund debenture .....		98,000.00	

	Face value.	Book value.
Chicago, R. I. & P. Ry. Co.—first and refunding mortgage, gold.....	\$3,747,000.00	
Colo. & South. Ry. Co.—ref'g and ext'n	802,000.00	
Total .....	\$15,490,918.44	
Included in stocks in treasury—unpledged:		
Cedar Rapids, Iowa Falls & Northwest-ern Ry. Co.....	\$2,600.00	
Central City Elevator Co.....	4,000.00	
Des Moines, Iowa Falls & Nor. Ry. Co..	1,000.00	
Nebraska Central Ry. Co.....	99,700.00	
Nebraska Construction Co.....	270,000.00	
Rock Island Coal Mining Co.....	10,000.00	
Chicago, Rock Island & Pacific Ry. Co..	812.50	
The Rock Island Co., preferred.....	994,330.00	
The Rock Island Co., common.....	62,000.00	
Town and land companies in Kansas...	207,150.00	
Western Coal & Mining Co.....	36,000.00	
Other stocks .....	12,400.00	
Total .....	\$1,699,992.50	
T'l bonds and stocks in current assets.	\$22,668,610.94	\$20,654,538.86
Recapitulation.		
Included in capital assets.....	\$17,730,100.00	\$11,095,973.62
Included in current assets.....	22,668,610.94	20,654,538.86
Total securities owned.....	\$40,398,710.94	\$31,750,512.48

\* \$3,000 owned jointly with the Chicago & Alton R. R. Co.

## ST. LOUIS AND SAN FRANCISCO RAILROAD COMPANY—TWELFTH ANNUAL REPORT.

## To the Stockholders:

The Board of Directors herewith submit their report of the operations and affairs of the St. Louis & San Francisco Railroad Company's Lines (exclusive of the Chicago & Eastern Illinois Railroad), for the fiscal year ended June 30, 1908.

The results of operation for the fiscal year were as follows:

Operating revenue (decrease \$2,447,849.25, or 6.4 per cent.).....	\$35,806,132.11
Operating expenses (increase \$236,350.08, or 1 per cent.).....	25,092,924.94
Net operating revenue (decrease \$2,684,199.33, or 20 per cent.).....	\$10,713,207.17
Taxes (increase \$51,456.49, or 5.7 p. c.)..	948,414.62
	\$9,764,792.55
Miscellaneous income (decrease \$324,633.74, or 17.3 per cent.).....	1,548,557.00
Total income .....	\$11,313,349.55
Interest, rentals and other fixed charges..	10,854,283.41
Net income after providing for all charges.	\$459,066.14
Dividends paid—4 per cent. on 1st pfd. stock	199,742.12
Balance surplus carried to profit & loss	\$259,324.02

## Mileage Operated.

The average mileage of main track operated during the year was 5,064.16 miles, being an increase of 2.44 miles over that of the preceding year.

The total mileage in operation at June 30, 1908, was 5,064.16 miles, and is the same as that at the end of the preceding year, the Colorado Southern, New Orleans & Pacific Railroad Company still operating its lines for account of construction.

## Capital Stock.

At a special meeting of the stockholders held August 27, 1907, authority was given to increase the authorized capital stock of the company from \$100,000,000 to \$200,000,000, such increase to consist wholly of common stock and was for the purpose of conforming to the Missouri law, which prescribes certain relations between capital stock and bonded debt.

There was no change during the year in the amount of stock issued and outstanding.

## Funded Debt.

The total funded debt at June 30, 1907, including that of leased and auxiliary lines was.....\$177,520,302.20  
There was added during the fiscal year.....12,370,415.54

Making total funded debt at June 30, 1908.....\$189,890,717.74

In August, 1907, the company authorized the issue of general lien 15-20 year gold bonds bearing interest at not to exceed 5 per cent. per annum, to the aggregate amount of \$115,000,000, which has since been reduced to \$112,994,000 through the sale of \$2,006,000 of refunding mortgage bonds under the provisions of section 3, article 3, of the general lien mortgage.

These bonds are issuable for the following purposes:

\$10,000,000	for reimbursement to the company of capital expenditures made during the fiscal year ended June 30, 1907, and for future expenditures for additions and improvements.
50,220,000	reserved to retire underlying bonds.
5,000,000	reserved for refunding purposes.
11,539,000	reserved to take up, at or before maturity, a like amount of equipment notes.
5,000,000	reserved to pay equipment trust obligations issued after June 1, 1907, to the extent of 60 per cent. thereof.

\$28,241,000 reserved for additions and improvements, to be made after June 1, 1909, and to be issued in amounts not to exceed \$2,500,000 for any one fiscal year until June 30, 1911, and after that date to be issued in amounts not to exceed \$3,000,000 in any one fiscal year.

5,000,000 reserved to be issued in amounts not exceeding in the aggregate \$1,000,000 per annum after June 1, 1909, for construction, purchase or acquisition of additional lines of railroad or branches.

Total, \$115,000,000

The amount of these bonds issued at June 30, under provisions of the mortgage, was \$17,509,043.81, all of which are still owned by the company.

The \$2,055,300 of Kansas City, Fort Scott & Gulf Railroad Company first mortgage 7 per cent. bonds which matured June 1, 1908, were by agreement dated May 1, 1908, with the trustee and the holders of the bonds, extended to June 1, 1911, with interest at rate of 5 per cent. per annum. This arrangement effects a saving in interest of \$41,106 per annum.

## Equipment Bonds and Notes.

The amount of equipment bonds and notes outstanding at June 30, 1907, was.....\$12,450,489.79  
The net addition during the fiscal year was.....5,218,192.40

Making the total amount of equipment bonds and notes outstanding at June 30, 1908.....\$17,668,682.19

## General.

During the year the company took title by deed to the following properties heretofore controlled by stock ownership:

St. Louis, Memphis & Southeastern R. R.;  
Blackwell, Enid & Southwestern Ry.;  
Ozark & Cherokee Central Ry.;  
Arkansas Valley & Western Ry.;  
Fort Smith & Van Buren Bridge Co.;  
Oklahoma City & Western R. R.;  
Sulphur Springs Ry.

The number of passengers carried during the fiscal year increased 974,774, or 13.08 per cent. The passengers carried one mile increased 56,287,064, or 15.73 per cent. Notwithstanding these increases, however, there was a decrease in passenger revenue of \$239,289.73 caused by the compulsory reduction of rates in many states.

The Memphis Railroad Terminal Company was incorporated March 5, 1907, for the purpose of erecting a new passenger station with requisite buildings and tracks at Memphis, Tenn. This company and nine other railroad companies entering Memphis have joined in the guarantee of the necessary funds (\$1,200,000) to purchase property for the station. The capital stock of the company is \$100,000, of which each of the 10 roads owns one-tenth, or \$10,000.

The industrial department reports the location on the tracks of the Frisco Lines during the year of 266 industrial plants, employing 7,954 men and costing \$5,590,000.

The reports of the current year's crops in the territory tributary to the company's lines are favorable.

Due acknowledgment is made of the faithful and efficient services rendered by officers and employees during the year.

By order of the Board of Directors: A. J. DAVIDSON,  
President.

In the following statements all revenues, operating expenses, other income and train and engine mileage for the year ended June 30, 1908, are stated in accordance with the classifications required by the Inter-

state Commerce Commission, effective July 1, 1907. To furnish proper comparisons, the corresponding figures for the year ended June 30, 1907, are also re-stated, where necessary.

*Income Account, Fiscal Year Ended June 30, 1908, Compared with Previous Year.*

	1907-08.	1906-07.	Amount.	Increase or decrease. Per cent.
Avg. mileage operated.	5,064.16	5,061.72	2.44	..
Operating revenue:				
Freight .....	\$23,976,296.87	\$26,534,639.66	\$2,558,342.79	9.6
Passenger .....	8,927,036.90	9,166,326.63	239,289.73	2.6
Mail .....	979,927.21	885,662.71	94,264.50	10.6
Express .....	1,129,153.27	998,864.97	130,288.30	13.0
Miscellaneous .....	557,149.04	475,557.20	81,591.84	17.2
T'l transp'n revenue.	\$35,569,563.29	\$38,061,051.17	\$2,491,487.88	6.5
Revenue from operation other than transportation .....	236,568.82	192,930.19	43,638.63	22.6
T'l operating revenue.	\$35,806,132.11	\$38,253,981.36	\$2,447,849.25	6.4
Operating expenses:				
Maint. way and struct.	\$4,822,333.31	\$5,584,888.56	\$762,555.25	13.7
Maint. of equipment...	4,607,461.95	4,715,224.89	107,762.94	2.3
Traffic expenses .....	833,825.07	873,974.05	40,148.98	4.6
Transport'n expenses.	13,746,379.91	12,709,598.16	1,036,781.75	8.2
General expenses .....	1,082,924.70	972,889.20	110,035.50	11.3
T'l operat'g expenses.	\$25,092,924.94	\$24,856,574.86	\$236,350.08	1.0
Net operat'g revenue.	\$10,713,207.17	\$13,397,406.50	\$2,684,199.33	20.0
Taxes .....	948,414.62	896,958.13	51,456.49	5.7
Operating income....	\$9,764,792.55	\$12,500,448.37	\$2,735,655.82	21.9
Miscel. income:				
Outside operations...	\$32,078.81	.....	\$32,078.81	..
Hire of equipment...	369,506.05	\$85,671.00	283,835.05	331.3
Other income .....	1,950,141.86	1,958,861.74	8,719.88	.4
T'l miscel. income....	\$1,548,557.00	\$1,873,190.74	\$324,633.74	21.3
Total income .....	\$11,313,349.55	\$14,373,639.11	\$3,060,289.56	21.3
Interest .....	\$6,118,752.18	\$5,418,870.08	\$699,882.10	12.9
Rentals and sinking funds:				
Int. on guar. securities	2,564,203.43	2,549,320.63	14,882.80	.6

Other rentals and sinking funds.....	\$536,445.80	\$611,983.11	\$75,537.31	12.3
Divs. on trust certifs., K. C., F. S. & M. Ry.	540,400.00	540,400.00	.....	..
Divs. on trust certifs., Chic. & East. Ill. R.R.	1,094,482.00	1,094,482.00	.....	..
Total charges .....	\$10,854,283.41	\$10,215,055.82	\$639,227.59	6.3

Available for divs....	\$459,066.14	\$4,158,583.29	\$3,699,517.15	89.0
Dividends:				
4 per cent. on 1st pfd.	\$199,742.12	\$199,742.12	.....	..
Surp. carried to credit of profit and loss..	\$259,324.02	\$3,958,841.17	\$3,699,517.15	93.4

NOTE.—To preserve comparisons the revenue and operating expenses and other figures for year 1906-07 are re-stated hereon to conform with the classification of the Interstate Commerce Commission. Decreases in *italics*.

*Profit and Loss Account and Adjustments Therein, June 30, 1907, to June 30, 1908.*

Credit.				
Balance at credit, June 30, 1907.....			\$5,882,042.35	
Balance of income year to June 30, 1908....	\$259,324.02			
Miscellaneous liability accounts, written off..	61,112.53		320,436.55	
Total credit .....			\$6,202,478.90	

Debit.				
Annual instalment from franchises and property account, on account of difference between cost of underlying bonds refunded and proceeds of refunding bonds sold, and commissions paid therefor.....	\$250,000.00			
Discount on securities sold and exchanged, and expenditures in connection with listing, certifying and issuing new bonds (balance)	836,241.91			
Depreciation in the value of equipment destroyed and dismantled during current fiscal year .....	499,727.00			
State tax on increase in capital stock.....	50,000.00			
Miscellaneous accounts, written off.....	78,019.28			
Total debit .....			\$1,713,988.19	
Balance .....			4,488,490.71	
By balance at credit, June 30, 1908.....			\$4,488,490.71	

#### CONDENSED GENERAL BALANCE SHEET, JUNE 30, 1908, AND COMPARISON WITH PREVIOUS YEAR.

Assets.	1908.	1907.	Inc. or Dec.	Liabilities.	1908.	1907.	Inc. or Dec.
Capital assets:—				Capital Liabilities:—			
Franchises and property.	\$173,103,510.34	\$170,544,848.03	\$2,558,662.31	Capital stock:			
Stocks and bonds owned.	203,845.69	203,845.69	.....	First preferred .....	\$5,000,000.00	\$5,000,000.00	.....
Total franchises, etc..	\$173,307,356.03	\$170,748,693.72	\$2,558,662.31	Second preferred .....	16,000,000.00	16,000,000.00	.....
Leasehold estates:				Common .....	29,000,000.00	29,000,000.00	.....
K. C., Ft. S. & Mem...	52,312,051.01	51,729,525.06	582,525.95	Total .....	\$50,000,000.00	\$50,000,000.00	.....
K. C., Mem. & Birmhm	9,175,875.76	9,175,875.76	.....	Funded debt .....	\$134,624,997.74	\$123,054,582.20	\$11,570,415.54
Franchises, &c., aux. cos.	7,763,776.06	7,451,879.52	311,896.54	Outstanding securities on leasehold estate*:			
Cost, Chic. & East'n. Ill.:				Stock: Preferred certfs	13,510,000.00	13,510,000.00	.....
Preferred stock .....	9,321,550.00	9,321,550.00	.....	Funded debt .....	39,095,300.00	38,293,300.00	800,000.00
Common stock .....	18,239,237.13	18,239,237.13	.....	Equip. bonds and notes	2,429,100.00	2,885,202.00	456,102.00
Equipmt. under equip. trs	16,943,628.79	11,731,234.01	5,212,394.78	Total .....	\$55,034,400.00	\$54,690,502.00	\$343,898.00
Securities, cost of, under col. tr. notes, 1908..	.....	1,225,325.00	1,225,325.00	Outstanding securities on leasehold estate†:			
Total .....	\$287,063,474.78	\$279,623,320.20	\$7,440,154.58	Funded debt .....	9,247,420.00	9,247,420.00	.....
Current assets:—				Do., aux. companies.	6,923,000.00	6,923,000.00	.....
Cash in treasury .....	370,142.93	880,833.16	510,690.23	Chic. & E. Ill. R.R.:			
In hands of fiscal agts.	2,291,838.06	2,373,751.91	81,913.85	Stock trust certfs pf...	9,317,550.00	9,317,550.00	.....
Due frm agts & cndtrs:				Do., common .....	18,044,500.00	18,044,500.00	.....
Dr. ....	\$1,085,578.10	.....	.....	Equip. bonds & stks, out.	15,239,582.19	9,565,287.79	5,674,294.40
Cr. ....	47,656.51	.....	.....	Total .....	\$298,431,449.93	\$280,842,841.99	\$17,588,607.94
From R.Rs., acc't traffic:				Current liabilities:—			
Dr. ....	\$1,159,347.25	.....	.....	Aud. vouchers & payrolls	5,374,338.58	4,110,884.18	1,263,454.40
Cr. ....	1,103,732.11	.....	.....	Int. and div. matured...	2,510,660.70	2,695,243.10	184,582.40
Frm cos. and individuals:				Int. accrued (not due)...	1,147,176.38	1,000,417.62	146,758.76
Dr. ....	\$3,194,423.69	.....	.....	Taxes accrued (not due)	165,488.89	240,978.81	75,489.92
Cr. ....	3,681.89	.....	.....	Notes payable .....	11,987,035.90	5,577,250.00	6,409,785.90
Due from U.S. P.O. Dept.	3,190,741.80	2,385,149.01	805,592.79	Total .....	\$21,184,700.45	\$13,624,773.71	\$7,559,926.74
Securities in treasury....	248,707.40	236,328.35	12,379.05	Provisional accounts:—			
Supplies on hand.....	21,545,685.73	8,858,016.63	12,687,669.10	Sinking funds accrued...	282,554.87	295,042.53	12,487.66
Advances acc't construction (fundable)....	3,597,824.64	864,853.65	2,732,970.99	Equip. replacement fund.	5,747.14	.....	5,747.14
Total .....	\$36,324,780.86	\$20,082,005.95	\$16,242,774.91	Improvement fund.†....	7,563.47	7,563.47	.....
Deferred assets:—				Total .....	\$295,865.48	\$302,606.00	6,740.52
Open carrying accounts in process of adjustment:				Grand total liabilities.	\$319,912,015.86	\$294,770,221.70	\$25,141,794.16
Dr. ....	\$908,777.37	.....	.....	Profit and loss .....	4,488,490.71	5,882,042.35	1,393,551.64
Cr. ....	381,334.04	.....	.....	Total .....	\$324,400,506.57	\$300,652,264.05	\$23,748,242.52
Trustees skg. fund acc't..	527,443.33	506,939.72	20,503.61				
Sinking funds .....	406,895.53	352,456.93	54,438.60				
Total .....	\$1,012,250.93	\$946,937.90	\$65,313.03				
Total assets .....	\$324,400,506.57	\$300,652,264.05	\$23,748,242.52				

\*The Kansas City, Fort Scott & Memphis Railroad.

†Kansas City, Memphis & Birmingham Railroad.

‡Kansas city & Memphis R.R. & Bridge Co.

NOTE.—In stating the assets and liabilities of the companies covered by this balance sheet, the holdings of the St. Louis & San Francisco R. R. Co. in the bonds and capital stocks of leased and auxiliary lines are eliminated. Decreases in *italics*.